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Chicago, April 12, 1930

(Issued Every Other Week)

Volume XXXIII, No. 8

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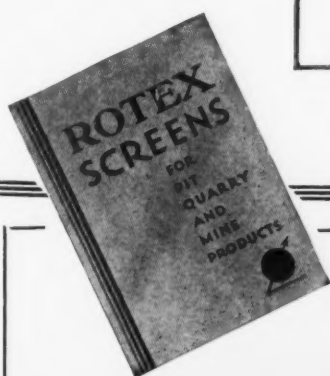
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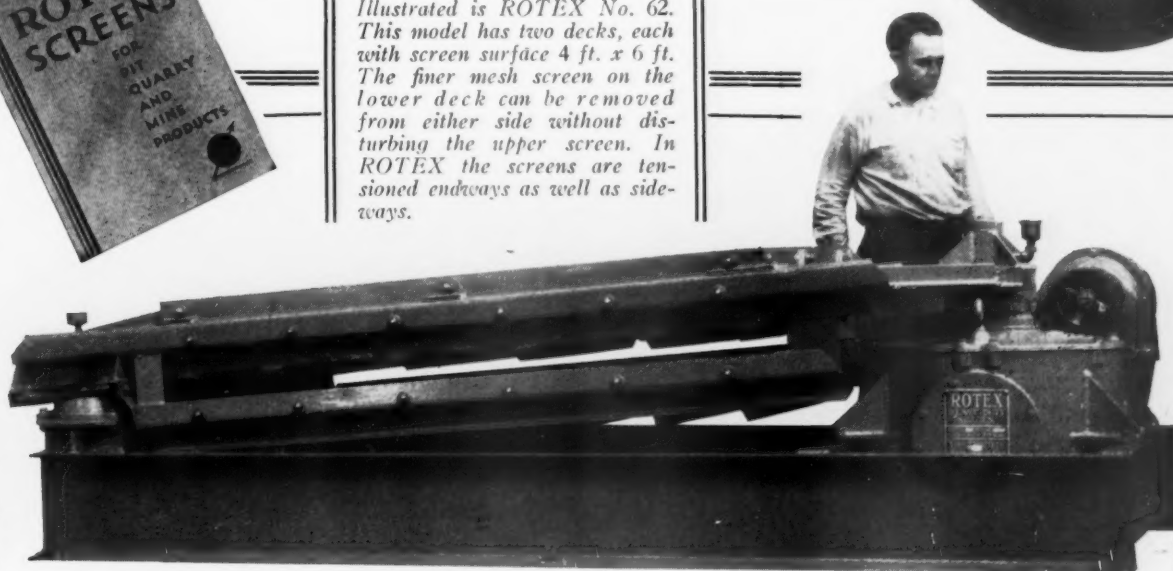
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## Sand and Gravel Developments in Texas— Some Typical Illustrations

Small Volume of Material Moved During the  
Winter Due to Unusual Weather Conditions

By Walter B. Lenhart

Associate Editor, Rock Products

TEXAS has just experienced the coldest and most severe winter that it has seen for 30 years or more; and that today is the main topic of conversation among the gravel producers, for the severity of this winter was such as to hold up practically all highway and commercial construction work, resulting in shipments in several cases being practically nothing during the months of December, January and part of February. During the later part of February the rains and cold weather ceased and producers were beginning to see a brighter outlook for the months to follow, although they were not overly optimistic about the total volume that will be moved during 1930. Several producers who were planning on making extensive alterations to their plants were skeptical as to the advisability of doing so, for they felt that the unsettled weather conditions were such as not to justify further plant extensions. One company has plans for a new plant near Dallas but may drop the program for another year solely due to the slowness of early season business due to the severe winter.

### Gifford-Hill Operations

Gifford-Hill and Co., Inc., for years extensive operators in Texas, however, were not deterred from going ahead with

the construction of their new plant at Texarkana, Tex. This company has operated a pit deposit and washing plant about seven miles south of Texarkana on the Cotton Belt railroad, which in many respects was one of

the most unusual operations to be found anywhere in the United States. Before going further it might be well to add that gravel in the vicinity of Texarkana, and for that matter in all of eastern Texas, is quite scarce and is daily becoming more so; thus the striking feature in all these operations is the amount of overburden that has to be removed in relation to the amount of sand and gravel recovered. At the Texarkana operation (near Sledge, Tex.) of Gifford-Hill and Co., Inc., this feature is particularly noticeable. The amount of overburden that has to be removed is so great that the operation has ceased to be profitable and will be abandoned as soon as the new pit and plant, located about 4400 ft. from the old plant, has been placed in operation. At the time of inspection 20 ft. of clay loam was being stripped off to get 4 to 5 ft. of gravel; and it was stated that 27 ft. had recently been removed to get 8 ft. of gravel. At the new pit an average of only 4 ft. of overburden will have to be removed to get 4 to 16 ft. of material that will average 40% gravel. Gravel in Texas is generally all of small size and rarely does the deposit contain any great amount of material that will run over 1½-in. This deposit is no exception. A sufficient acreage has been tested out by means of pits, etc.,



Gifford-Hill operations at Texarkana, Tex., showing area above water, which is practically all strippings



*Stripping on one of the Gifford-Hill operations near Dallas, Tex.*

to insure a total of at least 800,000 cu. yd. of material.

The overburden will be removed by a 50-B Bucyrus-Erie electric dragline mounted on crawler treads using a 2-yd. bucket. The loading will also be done by this same piece of equipment. The company also has a No. 206 P. & H. dragline mounted on crawler treads that can be used for this and other work. Western cars of 4 cu. yd. capacity will be used, to be handled by 3 Plymouth gasoline locomotives, which have recently been overhauled and had new Climax engines installed.

The cars discharge to a wooden hopper built in a concrete pit, from which the material is fed to a belt conveyor serving two batteries of Dull screens. The conveyors, screens, conveyor idlers and the silent-chain drives were all supplied by the Link-Belt Co. The designing and construction was done by Gifford-Hill and Co., Inc., engineers. The motors were all supplied by the Westinghouse Electric and Manufacturing Co., and the rubber belts by the United States Rubber Co.

The outstanding feature of this plant, and the one that distinguishes it from almost any other similar gravel screening operation using the conical screening system of the Link-Belt Co., is that instead of having a steel plate under the upper conical screen and catching the minus 2½-in. material to deliver it to the next conical screen below, a slotted steel plate has been installed instead. This plate has ¾-in. by 3/16-in. slots and its purpose is to remove most of the sand and dirty water at the beginning of the screening operation instead of dragging this sand and water through the succeeding screens. Fresh water will be added at the second screen to make up for that which passes out with the finer

sand through the slotted plates.

To describe the screens in more detail: The upper conical screen has a double cone, the inner one acting as a scrubber to assist in breaking down clay balls that are present to some extent. This inner cone has 2½-in. round perforations and the outer conical screen has 2-in. round openings. The second



*A Gifford-Hill washing plant near Dallas*

screen, below, has 1¼-in. round openings and the two succeeding screens have ¾-in. and 3/16-in. round openings, respectively. The fine sand removed by the slotted plate at the head of the operation will be classified in two 72-in. Link-Belt cone classifiers and any remaining sand that is carried through the entire system will be removed and classified in a 60-in. and 72-in. cone classifier of the same make.



*Trinity plant of the Gifford-Hill units at Fort Worth, Tex.*

The screens and cone classifiers are all mounted over eight wooden bins that rest directly on the ground, there being four bins for gravel, two for the finer grades of sand, one for coarse sand and one for the oversize material. The oversize will not be crushed but will be disposed of as is, although later a jaw crusher may be installed and this material crushed. This feature has been taken care of in the design of the plant so that the crushed material can be chuted direct to the inclined belt serving the conical screens.

There are two conveyor belts of major importance in the plant, one serving the Dull screens and one that passes alongside the bins and is used for reclaiming from the storage bins. Both the belts are 30-in.

The material in the track hopper is first fed to a short (40 ft. c. to c.) horizontal 30-in. belt that discharges to the main inclined belt which serves the plant and operates on 220-ft. centers, and to the reclaiming belt which operates on 289-ft. centers. Both are directly connected to 25- and 30-hp. Westinghouse electric motors through Link-Belt, silent-chain drives. The conical screens are driven by 15-hp. line-start, type C. S. induction motors.

Owing to the fact that when gravel is encountered in this district water is usually struck at the same time, it was not advisable to reclaim the washed material from the bottoms of the bins by means of a tunnel passing under the bins, as is the practice at the Grand Prairie plant of this company. The gravel is reclaimed by having the belt run alongside the bins and the material is drawn to the belt.

Just prior to loading, the gravel is given a final washing in a short rotary, "barrel" washer having ¼-in. perforations, the oversize being chuted to the cars and any fines bypassed. Segregation is not a condition that requires attention in the vicinity of Texarkana as yet. Sand can be loaded direct to cars from the bins, as a railroad has been provided that passes along the opposite side of the plant on which the reclaiming belt operates.

There is plenty of water in the immediate vicinity, a small stream passing near the plant, across which a dirt dam has been thrown; and water is delivered to the plant

by a 6-in. Chicago Pump Co. centrifugal pump direct-connected to a 60-hp. General Electric motor. The pump operates at 1775-r.p.m. and will deliver 1500 g.p.m., all of which is about equally divided among the two batteries of conical screens. Spiral pipe,

8-in. in diameter, supplied by the Taylor Forge and Pipe Works, delivers the water from the pump to the washing screens.

For day operation it is anticipated that 25 men will be required in the plant and pit, with a night crew of 18 men if business should justify night work. J. A. Whyte is superintendent and J. W. Higgs, engineer in charge of construction. The plant was designed under the direction of J. Rutledge Hill, vice-president of Gifford-Hill and Co.

## Trinity Gravel Company Operation

During the summer of 1929 the old plant of the Trinity Gravel Co. at Hart Spur, near Dallas, Tex., was purchased by Gifford-



**Showing a dragline in a pit near Austin, Tex., the only deposit visited at which stripping was not necessary**

Hill and Co., and it is expected that some time this spring or summer a plant similar to the one built at Texarkana will be erected. The old plant is at present operating to capacity.

At this deposit about 4 ft. of stripping is necessary to get 8 ft. of gravel that will average about 50% gravel and 50% sand. Monighan walking draglines, 3-yd. capacity, are used for stripping and loading.

The plant uses a small rotary screen, mounted directly over four conical steel bins, from which the material is reclaimed by a belt conveyor running below. The plant has a capacity of nine cars per day, and is driven by two Venn Severin oil engines, one a 35-hp. and the other a 25-hp. single-cylinder unit. A Telsmith cone is used for sand classification. Fred Fanning is acting superintendent of this plant.

## Grand Prairie Operation

One of the most active of the Gifford-Hill plants is that at Grand Prairie, near Dallas. It is known as the June plant. This plant is practically a duplicate of the plant at Texarkana except that it does not use the newer idea of a slotted plate under the head conical screen. The material is reclaimed from the bins by a belt running through a tunnel under the bins, but owing to water troubles this method was not incorporated in the newer plant, as already noted.

The company uses three Bucyrus and Monighan draglines for the loading and stripping operations, operated by steam with natural gas for fuel. For this purpose the gravel fields have been piped and at frequent intervals outlets are provided from which the gas is distributed to the draglines by flexible hose. This is perhaps one of few similar operations that uses natural gas for fuel, but the system has proven highly satisfactory from mechanical and economic standpoints.

Here, as at the Texarkana plant, the material as it is being loaded is given a final rinsing by means of a rotary washer, after which the gravel passes over a stationary dewatering screen and thence to the cars. The sand is classified by three 72-in. Link-Belt cones into three grades; a fine sand for railroad use and for brown coating interior plaster, a concrete sand and a brick mason's sand.

The plant is approximately 12 miles from Dallas, between that city and Ft. Worth, and its location is such that it acts as the repair or mechanical center for all of the Gifford-Hill operations. All major repair jobs to draglines, transportation equipment, etc., if possible, is done at this plant. F. R. Gifford is superintendent.

## Dallas Washed and Screened Gravel Company

Another operation that was visited on this editorial trip was that of the former Farrell-Inge Gravel Co. at Clowdy, Tex. This plant and pit were taken over by the Dallas Washed and Screened Gravel Co. during



**Washing plant of the Dallas Washed Sand and Gravel Co. at Clowdy, formerly the Farrell-Inge Gravel Co.**

September of 1929 and continue to be operated by the new owners.

This plant uses Link-Belt conical screens, three in series, with the sand classified by a Link-Belt cone. A Deister vibrating screen is used to take out, when it is desired, the 3/4- to 1 1/2-in. from the 2 3/4- to 3/4-in. material produced from the conical screens.

At the pit, 3 to 5 ft. of stripping is removed to get 12 to 15 ft. of gravel. The stripping is done by a Monighan dragline, having a new 100-hp. Fairbanks-Morse, Diesel engine. Loading is done by the same equipment. Transportation to the plant is done in standard-gage railroad equipment.

In connection with the operation of the Diesel engine, it was said, that in a test conducted recently using two grades of oil, one an oil costing 3 3/4 c., f.o.b., Ft. Worth, ran the equipment 7 1/2 hours and consumed 55 gal. of oil; a second oil, 36 to 40 deg. gravity, costing 4 1/4 c. per gal., ran the dragline 10 hours on the same number of gallons. This made the two oils stand about equal as to the total cost of operation per hour.

## Fort Worth Sand and Gravel Company

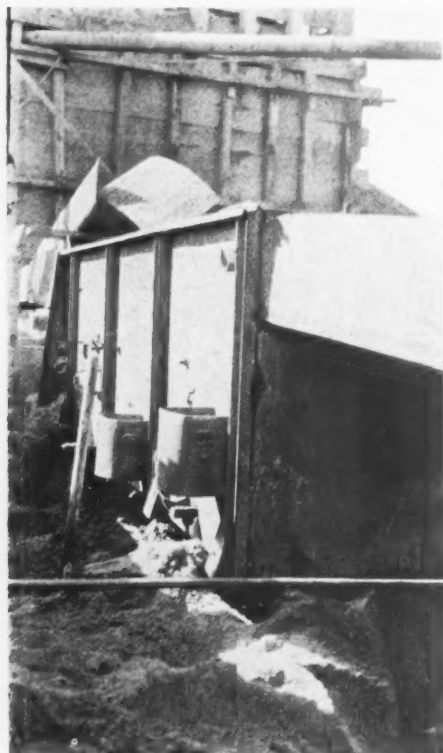
The new plant of the Ft. Worth Sand and Gravel Co. was also visited. This plant uses Leahy screens throughout and was one of the outstanding gravel plants built during 1929. A description of this plant was published in ROCK PRODUCTS, January 18, 1929.



**The new plant of the Fort Worth Sand and Gravel Co., which was described in Rock Products, January 18, 1929**

### Plants Near Austin

In the vicinity of Austin, Tex., there are three small sand and gravel operations, none of which have direct railroad connections, all shipping into Austin and the contiguous territory by motor truck. The Austin Sand and Gravel Co. has a washing plant practically within the city limits of Austin, and secures its gravel from a pit close to the plant by means of a  $\frac{3}{4}$ -yd. slackline cableway excavator. Washing is done in a rotary screen with sand classified in settling troughs



**Sand settling boxes at the plant of the Travis Co., Austin**

of the company's own construction. W. C. Moore is the sole owner of the Austin Sand and Gravel Co.

A second and newer plant in this district is that of the Travis County Sand and Gravel Co., which has a plant about two miles east of Austin and across the Colorado river from the business section of the city. At present gravel is excavated from a pit about 40 ft. deep by means of a  $1\frac{1}{2}$ -yd. Sauerman slack-line, cableway excavator, but this is by no means the depth of the deposit, as bottom has not as yet been deter-



**Travis Sand and Gravel Co. operations near Austin, Tex.**

mined. This deposit, in common with all the others in the district, requires no stripping, a condition that is unusual for Texas gravel deposits.

Sizing is done by a Telsmith rotary screen 18 ft. by 48 in., having an 8-ft. dust-jacket of  $\frac{1}{4}$ -in. perforations. The main barrel has an end section of 4 ft., of  $2\frac{1}{2}$ -in. round perforations, next a 4-ft. section of  $1\frac{1}{2}$ -in. round, 2 ft. of 1-in., and then two 4 ft. sections of  $\frac{1}{2}$ -in. round perforations. The oversize falls to a No. 3 Telsmith gyratory crusher and discharges to a bucket elevator that returns this stone to the washing screen. A 20-hp. Fairbanks-Morse electric motor direct-connected to a 6-in. F.-M. centrifugal pump supplies water for washing. The balance of the plant requires 175 hp, consisting of a 100-hp. General Electric motor on the slackline cableway and a 75-hp. motor that drives the crusher, rotary screen and bucket elevator through a line shaft. Sand is obtained by a series of settling tanks. The concrete sand is obtained by means of a settling tank under the sand jacket and the surplus is washed to the sand plant where the finer grades of brick and plastering sand are obtained by a series of settling tanks, the surplus from these tanks going back into the pit.

Delivery is made with a fleet of 2 yd. Indiana trucks with hydraulic dump beds. Each truck of gravel after being loaded passes under the auxiliary washing rack

where the material is rinsed to remove any muddy water or slime coating. Tests have proven that this final washing improves the quality of the aggregate considerably.

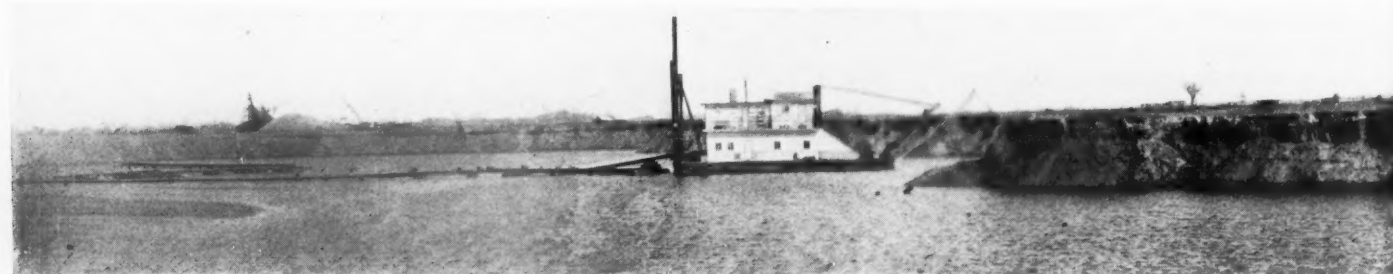
The plant has a capacity of 600 to 700 yd. per day. The capacity has been increased from 300 yd. to the present capacity within the past year. The plant is well lighted for night operations and during the months of August, September, October, November and December the plant operated 24 hour shifts to be able to take care of the demand.

The City of Austin has started an extensive building and improvement program including street paving, sanitary and storm sewers, rehabilitation of the water and light plants which when completed will amount to approximately 10 million dollars.

The Texas University, which is located at Austin, has recently awarded building contracts in the amount of approximately  $1\frac{1}{2}$  million dollars and will probably spend another  $3\frac{1}{2}$  million dollars for additional buildings and improvements in the near future.

The Travis County Sand and Gravel Co. has supplied the bulk of the sand and gravel used on the improvements and is contemplating increasing the capacity of their plant to 1000 yd. a day to take care of the increasing demand.

Up to the present time the entire output has been taken by the local trade and from



**Unusual features of control distinguish this Haden Co. dredge**

all indications it will be able to use the output for the next few years at least. However, the company is planning a connection to the railroad, a distance of about one mile, to facilitate supplying the demand for material for road work and other work in the vicinity of which there is a great volume under construction and in prospect.

Tests of the aggregate produced show it to be of exceptionally high grade both as to quality and grading,

the plant being arranged to give any desired grading in any of the sizes of aggregate required. The same is true of the sand, several gradings being obtained on it to meet the different requirements for the different classes of work.

The company has 80 acres under lease for gravel operations which tests show to be underlaid with a gravel deposit at least 50 ft. in depth.

R. E. Janes, president, and C. W. Janes, vice-president, are sole owners of the company. Park Terrell is in charge of the plant, and E. P. Wilcox is in charge of the plant office. M. Brandon is in charge of the main office located at 511 Scarbrough building, Austin, Texas. H. E. Janes, assisted by O. O. Tanner, is in charge of the operations and sales.

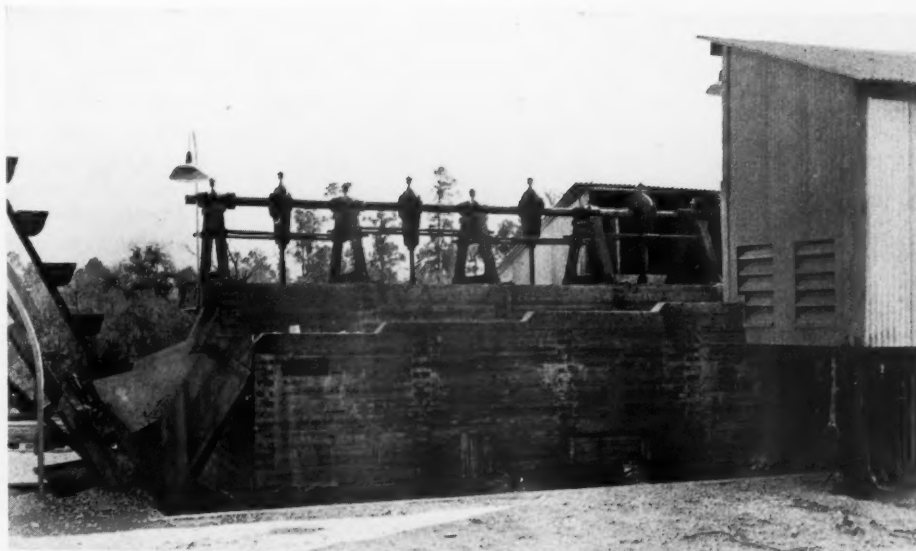
The third operation in this district is that of the Southern Gravel Co., which operates a slackline, cableway excavator and washing plant about four miles up the Colorado river from Austin. A. D. Alderson is president of this company.

#### **Texas Construction Material Co.**

Texas Construction Material Co., with offices in the Petroleum Bldg., Houston, Tex., now operates five units at Gemmer and Tanner Spur with a 24-hour capacity of 4,000 tons of concrete materials and 1500 tons of road gravel. In addition to this are two units at Laban Spur with a 24-hour capacity of 4500 tons of concrete materials; one unit at Talton Spur with a capacity of 1000 tons of road gravel only. All of these are of the portable plant type.

The company also operates one 15-in. dredging unit at Eagle Lake with a 24-hour capacity of 1600 tons of concrete materials; two 10-in. dredging units at Romayor, Tex., with a capacity of 1800 tons of concrete materials, and one portable plant at Buda with a capacity of 2000 tons of road gravel.

According to W. E. Sampson, vice-president and general manager, the plant at



**A view of the jigs Mr. Lenhart describes at the Haden plant**

Buda is unique in that it is the only one of its kind in that portion of the state, as far as he knows, that is processing a road gravel which is screened and the oversize crushed so that it can be made to conform to state highway specifications.

The Texas Construction Material Co. continues to manufacture and has standardized on 3-yd. Diesel engine draglines at its shops at Gemmer and Tanner Spur and still builds portable screening plants of both one- and two-screen capacity.

In May, 1929, the Gemmer and Tanner properties and the gravel properties of the Beaumont Building Material Co., Beaumont, Tex., were consolidated under the name of the Texas Construction Material Co. with a capital stock of \$600,000. In June a further consolidation was made with the Columbus Gravel Co., with an increase of capital stock to \$800,000. On January 1, 1930, a further consolidation was made with the Colorado County Gravel Co., increasing the capital stock to \$1,000,000 and with officers as follows: President, W. H. Gemmer; vice-president and general manager, W. E. Sampson; vice-president, E. A. Fletcher, and secretary-treasurer, E. P. Gemmer.

#### **Haden Company's New Plant**

The W. D. Haden Co., Houston, Tex., has for years been a large producer of oyster shells along the Gulf of Mexico, producing several million tons of shell per year. The company's most recent venture is in the lime business. It has the only rotary kiln in the United States (and probably in the world) that is used for burning lime from oyster shells. A complete description of this operation was published in *Rock Products*, December 21, 1929.

The Haden Co. also went into the gravel business in 1929 when it took over the old plant of the West Point Co., which had operated at that site from early in 1927 to February, 1929, when the present owners

assumed charge and began construction of a new washing plant, installing one of the few sand and gravel dredges of that size in Texas.

This dredge uses an Amsco pump 15-in., type H, left-hand, bottom discharge, direct-connected to a 500-hp., Fairbanks-Morse, type HV, 514-r.p.m. induction motor operating on 2300 volts, 60-cycle and 3-phase electric current. A 2½-in. F.-M. centrifugal pump direct-connected to a 7½ hp. motor supplies the

water for priming the dredge pump.

The dredge itself and the digging ladder with other miscellaneous items were constructed by the Ellicott Machine Corp., Baltimore, Md. The hull is of wood, 40 ft. by 85 ft., and is equipped with a ladder capable of reaching to a depth of 65 ft., although at present only the top 35 ft. of the deposit is removed. The under water overburden is silt about 4 ft. thick.

A Westinghouse 75-hp. armored motor is used to operate the cutter, and a second 2½-in. pump unit is being installed which will be direct-connected to a 15-hp. motor for supplying water for hydraulicking the bank above the water level.

The feature that distinguishes this dredge from most of the dredges used in the gravel industry is the method used for raising and lowering the digging ladder and the control of the various lines that are necessary for the successful operation of the dredge. The lines are controlled from the dredge captain's cabin by a series of clutches that are operated by compressed-oil cylinders. A 5-in. by 4-in. Worthington triplex pump geared to a 5-hp. Westinghouse motor compresses the oil for operation of the clutch throwing mechanism. Water was first used in these cylinders, but owing to the cold weather oil was substituted on account of the danger from freezing. A 25-hp. Westinghouse motor operates the cable reels.

The screening and washing plant has two batteries of Link-Belt Co. Dull conical screens with four screens to each battery. The two sets are not identical as to size of perforations. One set has, starting with the highest screen, 2¾-in., 1½-in., 1⅛-in. and ¾-in. round perforations, while the other has 2¾-in., 1½-in. and ½-in. round perforations, with the end screen having ¼-in. by ¾-in. slotted plate. Two Shaw sand classifiers are used for classifying the coarse sand and a No. 7 and a No. 8 Tel-smith sand tanks for classification of the finer grades of sands.

The Shaw classifiers are in series with the Telsmith cones.

The deposit contains about 60% gravel that is of a size larger than  $\frac{1}{4}$ -in., giving a surplus of sand, most of which is returned to the dredge pond from the pit serving the two bucket elevators, that deliver the gravel to the washing screens. The material from the 15-in. pump is first delivered to a dewatering hopper, which also acts as a sand-separation hopper. The amount of sand sent to the plant can be regulated by blanking off the stationary screens in the bottom of the hopper.

This hopper discharges the gravel to two concrete pits that act as the boot to two 30-in. Link-Belt bucket elevators, equipped with manganese-steel-tipped, replaceable lips, for the wear on these buckets is considerable, because they have to do some digging, it might be said, in the pit. The elevators are each driven by 40-hp. motors through Link-Belt, silent-chain drives. All the motors in the new plant are Fairbanks-Morse, ball-bearing, induction motors operating on 440-volt current.

These two elevators deliver to the two batteries of conical screens.

The oversize from the conical screens is chuted to a No. 3 Telsmith gyratory crusher that discharges back to the boot of the bucket elevator. This crusher is driven by a 35-hp. motor, and the Dull screens by a 40-hp. motor, the crusher being belted to its motor and the screens are powered through a Link-Belt, silent-chain drive.

#### *Jigs for Cleaning Gravel*

A feature in connection with this plant

that is unusual in the sand and gravel industry is the use of jigs for separation of talc or clay from the gravels. While this method of gravity concentration is not new, its use in the gravel industry is each year commanding more and more attention. The operators of this plant also have a jig washer for the oyster shells at the lime plant near Houston; and they state that as a washer and scourer the jig is hard to find an equal. At the lime plant the jig is used to wash sand and clay from the shells and has been in operation a considerable time with marked success, but the installation at the gravel plant had only been in operation about three hours at the time of inspection and owing to mechanical difficulties it was necessary to stop its operation temporarily and replace the eccentrics, that were made iron to iron, with brass liners.

For a description of the action of a jig the reader is referred to any treatise on ore dressing, or to Edmund Shaw's book, "Sand Settling and Devices for Settling and Classifying Sand" (published by Rock Products). It suffices to say here that water is made to pulsate up through the gravel bed at rapid intervals by means of pistons and cylinders. The pulsating action of the water causes a segregation of the heavier material from the lighter and in this case the lighter material passes off at the top of the cells and the gravel is recovered from gates near the bottom.

In a previous paragraph it was stated that the dredge was only taking the top 35 ft. of material, and that it is possible to dig a total of 65 ft. The reason that the dredge does not dig to the maximum depth is a

stratum of soapstone or clay at the greater depths; and until the jigs are in successful operation the gravel at these depths will not be touched.

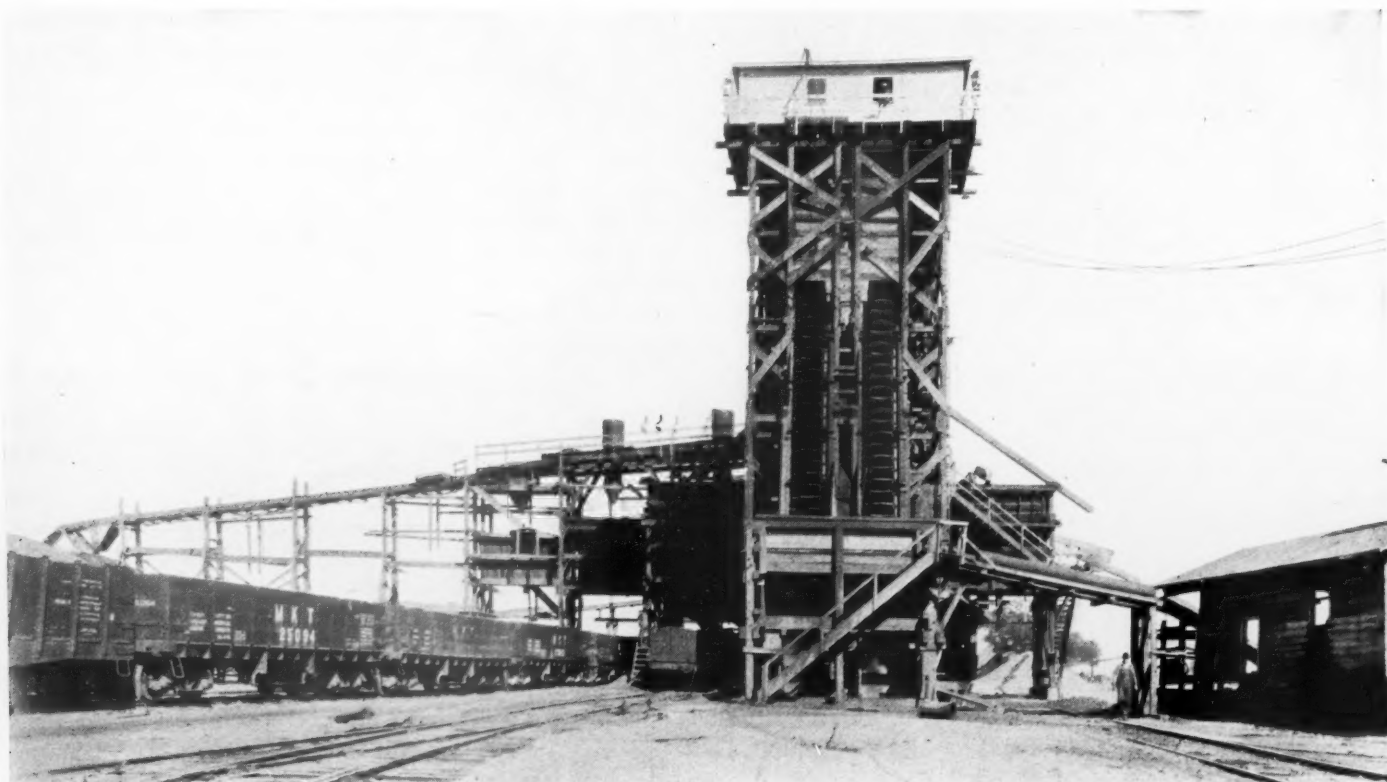
Owing to the fact that the jigs were located in such a position that it was impossible to get a picture of them, we are taking the liberty of showing the jigs that are in use at the lime plant, which is a similar installation, so as to enable the reader to get an idea of their construction. The tanks are all of laminated wood and the eccentrics and drive features were supplied by the Link-Belt company. The amount of power required to operate depends on the "throw" of the pistons and their speed. At this plant there is a total of 16 pistons operating in four banks of four each, and each bank requires a 50-hp. motor.

Water for the washing screens is supplied by two 6-in. F.-M. centrifugal pumps, each direct-connected to a 50-hp. motor, the two pumps acting in series, discharging to a common 10-in. line that serves the plant. The water at the conical screens is about evenly divided among all the cone screens. A third 6-in. pump supplies water for the jig.

Considerable material is carried on the stockpiles which is reclaimed by a  $1\frac{1}{2}$ -yd. Northwest clamshell crane mounted on crawler treads. Switching in the yard is done by a 20-ton Plymouth locomotive.

O. J. Carter is superintendent of the plant and J. W. Smith, Jr., has charge of the office.

West Point, Tex., is on the Colorado river, about 100 miles west of Houston, and is on the M. K. & T. and Southern Pacific railroads.



General view of the W. D. Haden Co. plant at Houston, Tex.

### Urbana Sand and Gravel Company

This company's operations are located near Urbana, about 60 miles northeast of Houston, Tex., and the gravel and sand comes from a pit deposit by means of two 8-in. dredge pumps. One of the pumps is driven by a 75-hp. Muncie Crude Oil engine and the other by a 75-hp. General Electric motor. The washing plant has a capacity of 25 cars of sand and gravel per day, but sand predominates. The bank will run about 15% gravel, all of which is of small size, practically all passing a 1-in. screen.

The Urbana Sand and Gravel Co. employ 25 to 30 men and came into prominence at the recent meeting of the National Sand and Gravel Association, at Memphis, when the company was awarded a ROCK PRODUCTS' safety trophy for the best accident record of any plant in its class.

While the plant is of small capacity, and owing to the use of gravity screens, the hazards to the workers are not great, yet in entering this contest the Urbana Sand and Gravel Co. has done the industry a signal service if for no other reason than in leading the way for other small producers, so that the Bureau of Mines can collect and compile statistics on the accident hazards of small sand and gravel plants. With such reliable statistics before them the producers can ask for reductions in accident and industrial insurance rates, which are believed at present to be unreasonably high for the hazards involved.

Mrs. Hazel Filler, general manager, and D. M. Filler, superintendent and sales manager, are proud of their trophy and are going to try to repeat the record next year. The company expects to build a new office and store building in the near future and the trophy will be appropriately mounted as part of that structure at that time. No small part of the glory for winning of this contest belongs to J. B. Jones, general foreman of the Urbana Sand and Gravel Co.

### Texas Sand and Gravel Company

The Texas Sand and Gravel Co., Waco, Tex., operates eight pits, three of which are in the immediate vicinity of Waco, the operations being about five miles from that



*Low screening operation saves power costs at Texas Sand and Gravel Co. plant at Waco*

city on the Southern Pacific railroad. The Waco operations use 10-in. Amsco dredge pumps which have their suction and discharge lines cut down to 8-in. T. J. Palm, vice-president of the company, has developed his dredging and screening operations so that they are about as efficient as any to be found anywhere. This development has not been along the lines of building bigger and larger capacity plants, but has on the contrary been towards the development of the efficient use of the smallest amount of equipment possible to do the work and to get a clean product.

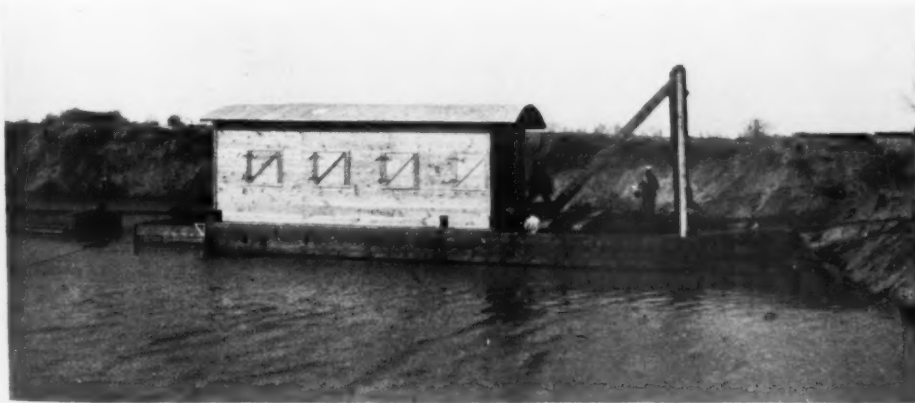
For instance, in the dredging operation, Mr. Palm points out that the velocity of the water in the suction and discharge line govern the lifting power of that water, which in turn reflects in the amount of power used. The velocity of the water in the pipe line should be such as to just carry the load of gravel and no more, consequently if a bell-shaped nose or "bull nose" is used at the cutter end of the dredge-suction pipe a large velocity will be required to offset this increase in cross-section; so acting on this theory he has, on one of his dredges, been using a simple open end pipe as a suction

line and on the other, which uses a Swintek nozzle or cutter, he has decreased the size of the bell at the receiving end considerably. By cutting down this opening he has been able to increase the life of the pipe lines and to cut down the power required. Similarly, by using a larger pump with the suction and discharge lines cut down to 8-in., the same economies apply.

Again the sand and gravel, when it reaches the plant, is not pumped to a great elevation, nor is it necessary to rehandle the material to get it to the rotary classifying screens; instead, Mr. Palm has mounted the screens as close to the ground as possible, and still operate them. The unwanted sands flow back to the dredge pond, and the gravel, which is all of one size, is elevated by a small bucket elevator to a point where it can be chuted to cars.

In the event that more of the sand is wanted a 4-in. centrifugal pump elevates it to a Tel-smith classifier, mounted over a small bin, thus the power required and the incidental expense necessary for handling the sand are done away with except when it is desired to ship sand.

At the time of inspection a new dredge was under construction, and this piece of equipment has all the advantageous features described in the previous paragraphs. It has a 10-in. Amsco pump belted to a 150-hp. motor. Mr. Palm prefers to use belt-driven pumps, for this allows them to vary the speed of the pump to meet changing conditions and variations in pumping distances. The dredge has a 25-ft. ladder equipped with a Swintek nozzle, which is mounted so that its supporting bearings are below the deck line. The cutter is operated by a 25-hp. General Electric motor which also operates the lifting mechanism through a counter shaft. The new plant will use a 4-ft. by 24-ft. heavy duty, Allis-Chalmers rotary screen having a 15-ft. sand jacket.



*New dredge under construction by the Texas Sand and Gravel Co. at Waco*

All of the gravel in the deposit is of comparatively small size and the deposit is covered with about 3 ft. of overburden, which is stripped off with a dragline and hauled away. The gravel contains considerable pea size, which in that part of Texas is hard to dispose of, and a large stockpile has accumulated.

About 2000 ft. from the new operation the older plant has been in operation for a considerable time, and it incorporates the same ideas as in the new plant except that the rotary screen produces sand, pea gravel, 1/4-in. to 1 1/2-in. gravel and oversize. All but the oversize falls to small pits below the classifier and is removed by a clamshell bucket, either to cars for shipment or to stockpiles located around a stiff-leg derrick. The oversize consists mostly of clay balls and is discarded; the clay invariably remains with the larger sizes of material.

#### Potts-Moore Gravel Company

The operation of the Potts-Moore Gravel Co., Waco, Tex., were described in the March 6, 1926, issue of *Rock Products*, and the operation remains practically the same as it was at that time. As Robert J. Potts, the president of the company, was elected president of the National Sand and Gravel Association this year, his operation is of added interest. The plant uses two batteries of Stephens-Adamson Manufacturing Co.'s Gilbert conical screens for sizing gravel. The sand is recovered in two wash boxes equipped with drags, originally designed by the Good Roads Machinery Co.

The two end screens, part of the conical screens, have slightly different meshed cloths, giving a coarse sand from one and a fine sand from the other, which fall to the two separate drag classifiers, thus producing the two sizes of sand. The sand discharges

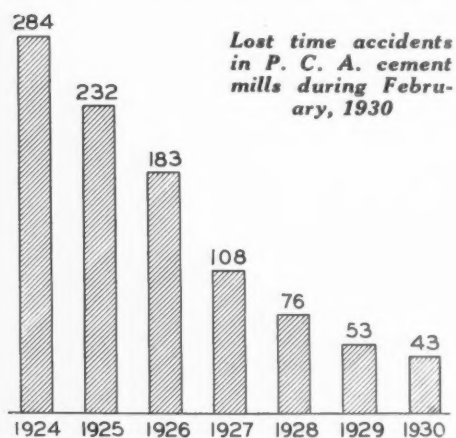
through a chute either to a stockpile or to the cars.

Excavating equipment has heretofore consisted of two Marion steam shovels, one 60 and one 61, and a 2T Monighan walking dragline, operations being varied to suit working conditions in the pit. A 3T Monighan walker was purchased recently and is now being installed. The gravel and sand are loaded to 12-yd. Western dump cars and delivered to the plant by steam locomotives, and the stripping is cast back into the pit.

A new deposit adjoining the older one has been recently prospected and pits sunk to the water line at about 100-ft. intervals, and gravel below the water line was determined by simply working a bar down as far as was possible. The newer deposit has 35- to 45-ft. gravel and 8 ft. of overburden. Further development of this pit is being contemplated at the present time.

### February Accidents at Cement Plants

THE TREND of February accidents in the cement mills during the past seven years shows unusual reduction. This is because the accidents which occur during February are due so largely to sheer carelessness and to such a small extent to unforeseen hazards incident to the process. Although February was a relatively light month for production, it has been a heavy month for accidents until recently. While



the reduction in February accidents again this year is encouraging, the rate of reduction is lagging behind as shown by the following table:

February	Number of lost time plus fatal accidents	Reduction in per cent of previous year
1924	284	.....
1925	232	19%
1926	183	21%
1927	108	41%
1928	76	30%
1929	53	31%
1930	43	19%

As the average rate of reduction for the past five years was over 28% and the average reduction in number of February accidents per year during that period was 38, it is apparent that the 1930 decrease is con-

siderably less than in recent years. Eighty out of 147 mills which report their accidents to the Portland Cement Association operated during the period from January 1 to March 1 without lost time or fatal accident.

Of the 43 reportable accidents in February one was fatal and 42 caused loss of time. The fatal accident occurred when a workman engaged in pulling down coal became engulfed in a slide which caused death by suffocation before he could be removed. Dropping of a large piece of shale from the ceiling of a shale pit caused serious head injuries to three workmen. The accident list for the month was entirely free of mishaps due to defects of process or equipment and again reflects the desirability of training men to avoid careless personal habits.

### Universal Atlas Cement Company's Waste Prevention

AMERICAN INDUSTRY is saving millions of dollars yearly through waste prevention, according to A. C. Wilby, assistant to the president, Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., who spoke before the National Management congress in Chicago this month.

Mr. Wilby recited examples of savings made by salvaging and reclaiming old and broken machinery in his own company's plants. "When the spokes on a kiln trunnion roller cracked," he said, "we saved \$375 by repairing them with reinforced filler pieces welded in place instead of purchasing a new roller.

"Welding also was used to repair the cracked gear rim and flange on a locomotive crane turntable gear and the bed plate under the gear was then stiffened by welding on reinforcing plate. This cost \$70, as against a replacement cost of approximately \$1500. By patch welding a worn conveyor casing in the field while the conveyor was in operation, a mill shut-down was prevented. Another substantial saving comes from scrap

sheathings which are converted into gear casings at less than \$15 each."

Accident prevention is one of the effective means of preventing waste in industry, according to Mr. Wilby. "The co-operation of employees, combined with modern, mechanical safe-guards has enabled us to reduce accidents nearly 94%, compared with 10



A. C. Wilby

years ago," he reported. "Our Duluth plant has won the safety trophy 3 times and has a record of 785 days without a lost-time accident.

"A continuous waste-prevention campaign is maintained because spasmodic efforts, while often productive of immediate good results, do not hold steady interest and co-operation of the rank and file of employees.

"From the beginning of our campaign hundreds of employees have helped by submitting suggestions. All plants and offices have permanent waste-prevention committees, which study the problem."

# Safety Pledge and Rules of the France Stone Company

**NEW EMPLOYEES** of the France Stone Co. and affiliated organizations, Toledo, Ohio, are given instruction in accident prevention and handed a little booklet,  $3\frac{1}{2} \times 5\frac{1}{2}$  in. in size. Each booklet is numbered and its owner recorded. The fly leaf of the booklet carries a pledge, in duplicate, to be signed (in the presence of witnesses) by the new employee. One of these pledges is detached and filed in the home office, the other remains in the book, as a constant reminder to its possessor of his obligations, solemnly entered into, to read it and abide by the rules printed therein.

The booklet opens with the following quotation:

**"And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comforts of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks who were once strong men shall not longer be a by-product of industry."**

—J. B. JUHNKE

The following is the text of the booklet complete:

The object of plant safety rules is to explain how superintendents and employees can safeguard the lives and limbs of others while on or about the company property.

Read these rules carefully and understand them so you may help enforce them, thereby protecting yourself as well as others from injury.

Tools, machinery and places of work should be made as safe as possible and these can be kept safe only by the watchfulness of each employee. Safety tools and appliances together with Safety Rules will not prevent accidents unless properly used or applied by the workmen. Rules cannot enforce themselves nor a tool or machine repair itself and report their defects. If good rules are followed many injuries and accidents will never occur.

Accidents happen at unexpected times and places and can be prevented only by *eternal vigilance*. Reckless and indifferent workmen are not only inefficient in their work, but are a menace to their own safety and a great danger to the welfare of fellow workmen.

It is hoped that every employee will give his full co-operation in seeing that these rules are understood and enforced.

The superintendent will always welcome suggestions for the safety of his men.

## General

1. Superintendents and foremen will devote their efforts to the safety of employees and the practical enforcement of these rules.
2. Employees who are unwilling to obey these rules for their protection or who are willfully or habitually careless will be **DISCHARGED**.

3. Employees receiving injury—no matter how slight it appears—will report it at once to their foreman and the office. Waiting until next day may result in more serious developments in nature of injury.
4. Employees are forbidden to throw any material or engage in wrestling, scuffling or fooling of any nature on our property.

apparatus, cutting torch, engaged in babbitting, at the emery wheel (unless the emery wheel is provided with a shield), or while clipping stone or castings.

14. Buildings not fireproof must be provided with liquid fire extinguishers, and safety committee inspector should see

## SAFETY PLEDGE

Desiring to co-operate with this Company, I hereby pledge myself to study all the Safety Rules as contained in this booklet and comply with them to the fullest extent.

I further agree that I will be careful not only to avoid injury to myself but also to avoid injuring my fellow-workmen and to report to my Superintendent any unsafe condition or practice.

WITNESS

Signed

Supt.

My duties are

Plant

Employment date

*Facsimile of the safety pledge required of all employees of the France Stone Co.*

5. Employees are forbidden to leave their places of work and go to other parts of the plant except on business of the company.
6. Any employee having knowledge of a dangerous place, condition, apparatus or practice will report same to the foreman or superintendent. Employees that remark, "I knew it would happen—I looked for it," etc., will be brought before the plant safety committee to explain their neglect for not reporting dangerous conditions.
7. Suitable signs have been or will be placed at locations where the greatest need of care must be used. Sign warnings must be heeded.
8. All dark and dangerous places should be kept well lighted.
9. All tools, ladders, etc., must be returned to their proper places, and rubbish, waste, discarded clothing, etc., cleaned up.
10. Employees are **FORBIDDEN** to ride on engines, cars, cranes or any moving apparatus except when required to do so by nature of their duties.
11. The night watchman shall report to the foreman or superintendent any unsafe conditions or make any recommendations that come to his attention.
12. Visitors or persons not employed by us will not be permitted near any operations unless authority has been given by the plant office or accompanied by an employee as a guide. Report trespassers to the superintendent.
13. Proper type goggles must be worn by all employees using electrical welding

that this equipment is recharged periodically.

## Mill

15. Tools or any other materials must not be left on stairs, platforms, belts or machinery.
16. Loose boards with nails in them must be removed at once and holes in flooring repaired.
17. All chain falls, hoisting and trolley cables must be inspected regularly by safety committeemen and reported at meetings so proper guards or precautions may be decided upon.
18. Incline hoist to be locked during lunch hour or at any time while not in use.
19. In steam-operated plants an emergency distress signal should be installed so that it can be operated on any floor in the mill in order that machinery may be stopped in case an employee is caught in such machinery.

## Machines and Machinery

20. All gears, shafts, sprockets, belts and revolving set screws must be guarded.
21. Repairing, oiling or wiping of machinery must be done while machinery is not in motion, if at all possible. **DO NOT** put on belts while machinery is in motion.
22. When machinery guards are removed to permit repairs they must be replaced before machinery is again out into regular operation.
23. When machinery repairs are completed extreme caution must be exercised to see that all persons are in the clear before starting the machinery.

24. No employe will be permitted to use a cutting or welding torch until he is properly instructed by a competent person, and proper type goggles must be worn by the operator.
25. Do not use leaky hose on acetylene and oxygen tanks—inspect the hose before using.
26. Gages on acetylene and oxygen tanks should be inspected periodically in order to make certain that they register correctly.
27. When handling oxygen and acetylene tanks great care should be taken not to drop or bump them.
28. Employes should be careful of poisonous fumes when cutting brass or zinc, and a gas mask should be worn when performing such work.

#### Electrical

29. Persons not employed in power houses and switchboard rooms must KEEP OUT of them.
30. All switchboards and starters must have rubber mats in front of them (preferably on wood slat platforms) and non-conductive fire extinguishers must be installed near by.
31. Electrical current should never be turned on lines until it is certain that lines are clear.
32. Electrical work must be performed with lines dead, when possible, and when electrical lines or apparatus are undergoing repairs suitable signs should be hung on the disconnecting or starting switch cautioning against closing the switch.
33. Conduit wiring systems must be carefully grounded.
34. Exposed live electrical parts should be enclosed or guarded, and open-knife switches should be replaced by enclosed safety switches.
35. Power lines must be kept off the ground.
36. Do not make electrical connection without first scraping the ends of the wire bright and clean, and unless insulated do not allow joints to touch other joints, bare wires, rails, pipes, ground or other possible source of current or path of leakage.

#### Explosives

37. Do not smoke while using or handling any explosives.
38. Do not handle explosives near open lights, other fire or flame, or sparks.
39. Do not use any tools other than wooden wedges and wooden mallets for opening cases containing high explosives.
40. Do not drive a hole into a keg of blasting powder, but open the keg by removing the slide from the bung.
41. Do not use frozen explosives or attempt to thaw frozen dynamite.
42. Do not leave high explosives, blasting caps or electric blasting caps exposed to the direct rays of the sun.
43. Do not use metal tamping sticks or tamping rods in loading or tamping (stemming) explosives.
44. Do not force a cartridge of high explosives into a bore hole.
45. Do not explode a charge to spring or chamber a bore hole and then load another charge into it before it has cooled sufficiently.

46. Do not use old or damaged leading or connecting wire in blasting circuits.

47. Do not connect up or load bore holes for electric firing during the approach or progress of a thunder storm, and if charges are already loaded and connected, all persons should be kept at a safe distance from them while the storm is in progress.

48. Do not have electric wires or cables near detonators, explosives or charged bore holes at any time except for the purpose of firing the blast.

49. Do not fire a blast until everyone is warned and guards are stationed on nearby highway approaches.

50. Do not attempt to investigate a misfire too soon. When fuse and blasting caps are used, at least an hour should be allowed before returning to a misfire. In the case of electric blasting caps at least 15 minutes should be allowed.

51. In case of misfired charges in well drill holes part of the tamping may be removed and a small charge placed and fired near enough to explode the main charge. In plugger drill holes another hole should be drilled at a safe distance away, but with the view of exploding the missed charge. Great care should be taken to recover any explosives fired from a misfired charge.

52. Do not lace safety fuse through dynamite cartridges.

53. Do not cut fuse on a slant, but cut it square across. Cut off an inch or two of fuse to insure having fresh end inserted in blasting cap, and see that the fuse is seated against the detonating agent in the cap.

54. Do not use short fuse; cut fuse sufficiently long to extend beyond collar of hole for perfect safety.

55. Do not crimp blasting caps to fuse with pliers, knife blade or with the teeth, but see that the blasting cap is securely attached to the fuse by means of a suitable cap crimper.

56. Do not allow priming (placing of a detonator in the dynamite cartridge) to be done in a magazine.

57. Do not make up primers, that is, do not insert a blasting cap or electric blasting cap in cartridges of explosives before it is actually necessary.

58. Do not use any detonator weaker than a No. 6.

59. Do not attempt to remove or investigate the contents of a blasting cap or electric blasting cap.

60. Do not carry blasting caps or electric blasting caps in pockets of clothing, or in the bed or body of a vehicle containing other explosives.

61. Do not store blasting caps or explosives in any home, boarding house or other human habitation, or leave them lying around where children can get hold of them.

62. Do not leave explosives in a wet or damp place. They should be kept where it is clean, cool, dry, and well ventilated.

63. Do not store explosives so that the cartridges stand on end.

64. Do not store fuse in a hot place, as this may injure the fuse and cause the waterproofing material to damage the powder train.

65. Do not handle fuse carelessly in cold

weather. When cold it is stiff and breaks easily. It should be warmed slightly before using.

66. Do not have matches about you unless they are safety matches.

67. Do not allow explosives or drill holes (while being loaded with explosives) to be exposed to sparks, and wherever practical a portable shed shield of fire-proof construction should be used.

68. Do not attempt to take blasting caps from a box by inserting a wire, nail or other sharp instrument.

69. Do not spare force or energy in operating blasting machines.

70. Do not connect leading wire to blasting machines or allow it to come into contact with any other source of electrical current until immediately before firing and everyone is in a safe place.

71. Do not handle packages of explosives violently or slide them along floors or over each other.

72. Number of pop shots fired in one round should be governed by local conditions (such as area over which shots are distributed) and pop shooter should seek shelter when warning cap explodes.

73. When dynamite is removed from the wrapper in loading, wrappers should be put in holes.

#### Haulage

74. DO NOT couple cars with the hands—a light rod or stick must be used to hold the link up.

75. In switching cars, where there is more than one switchmen the one preparing knuckles or throwing switch should give the signal to engineer wherever practical—no other switchman should relay it to the engineer unless the man doing the work has given the signal first.

76. Burred tools are very dangerous—have them dressed at the blacksmith shop, and whenever necessary replace handles.

77. Track workers should maintain the "heads up" attitude to make certain there is ample clearance—never rely on another to give you warning.

78. Cars on a grade must be blocked and brakes set.

79. Truck drivers are to leave the cab while material is put in trucks by shovel or crane.

80. In cranking motor, use the safety hold. Place the thumb over top of crank handle alongside fingers and avoid a sprained or broken arm.

#### Cranes and Shovels

81. A safety pin should be used to lock boom engine throttle, hoisting throttle, and the swing throttle on steam shovels. Such lock to be made so that these throttles will be locked on centers, and this device should be used any time the machine is not in operation.

82. All moving should be done with the bucket closed, thereby giving two brakes.

83. Employes are forbidden to work directly under the crane bucket, and crane bucket and shovel dipper should rest on the ground when not in use.

84. Shovel and crane engineers should see that all men are in the clear before moving.

**Construction**

85. Stacked material should be so piled and removed as to safeguard employees against injuries caused by falling of the material. In using material DO NOT undermine piles.
86. Storing an excessive amount of material on scaffolds is prohibited.
87. No employee shall ride upon material hoists except when constructing or making repairs thereon.
88. Runways and inclines shall not be less than 18 in. in width and shall not have more than 1 ft. rise in each 2 ft. of run. They should have substantial supports and braces and tops fitted with nailed cleats when rise exceeds 1 ft. in a 5-ft. run.
89. Buildings more than 60 ft. high, in which it is impracticable to install permanent stairways for construction use, shall be provided with not less than one temporary stairway between floors, fitted with not less than 2x8 treads and with runs or flights built at angles not to exceed 45 deg. to floors or other horizontal parts to which they connect.
90. Overhead protection shall be provided for employees working below construction operations where there is danger of falling material and objects.
91. Stairs and platforms must have standard railings and toeboards.

**Foundry**

92. Never drop a chill in a full hand ladle—place it in ladle before it is filled.
93. Never use a rusty chill.
94. When filling bull ladle at cupola never catch over it with a hand ladle.
95. Wear Congress shoes when pouring—lace shoes are dangerous, and shoes with bad holes should never be worn.
96. When carrying molten metal, legging should be worn on leg next to the ladle.
97. Employees must not use damp or rusty ladles or skimmers, because of the danger of explosion.
98. Gangway should be cleared daily of gates, old iron or stumbling hazards before pouring.
99. When burning in castings be sure that place on the casting where this is to be done is dry and clear of rust. If necessary, clean or heat the casting first.
100. Do not fill your ladle too full—consider every drop a burn hazard.
101. Make certain the lining in ladle is in good condition so metal will not drop through.
102. The ring on ladle shank should be substantial to avoid danger of breaking shank while in use.
103. Allow ample clearance for men carrying metal along gangway from cupola.
104. When disposing of drops in pig bed, be sure sand is dry and not damp or wet.
105. Great caution against fires caused by sparks should be exercised when cupola is dropped at the heat. Wooden rafters may catch fire easily.
106. If there is a clasp on the bull ladle, see that it is in place before filling at cupola so it will not tip suddenly and cause injury to workmen.

## Portland Cement Industry Ranks High in Rise of Man-Hour Productivity

**D**ECIDED INCREASES in man-hour productivity of labor between 1914 and 1927 in 11 manufacturing industries ranged from 24% for the boot and shoe industry to 292% for the rubber-tire industry, according to a statement just made public by the Bureau of Labor Statistics, Department of Labor. It is pointed out that the changes made must not be attributed solely to increased efficiency of workers, as other factors enter in, such as mechanization, improvements of various kinds, and elimination of waste.

The 11 industries chosen were selected merely because the necessary statistical data on employment, hours, and productivity were available in satisfactory form, and while they cover a wide range of industrial conditions, they cannot be considered representative of the entire field of manufacturing, it was stated.

The following list, prepared from a table in the statement, gives the names of the industries and the percentage of increase in man-hour productivity by periods:

	1925-27	1914-27
	—Per Cent—	
Iron and steel.....	1	55
Boots and shoes.....	8	24
Leather tanning.....	5	41
Slaughtering and packing....	4	26
Petroleum refining.....	2	82
Paper and pulp.....	10	40
Cement manufacturing.....	12	54
Automobiles.....	—1	178
Rubber tires.....	11	292
Flour milling.....	11	59
Cane sugar refining.....	....	33

Employment and production figures from the census of manufactures for 1927 have permitted the extension of the Bureau of Labor Statistics' index numbers of man-hour productivity in 11 manufacturing industries to include 1926 and 1927. Recent information on former conditions also has afforded an opportunity for minor corrections in the figures published previously in the *Labor Review*.

The new figures show that between 1925 and 1927 there was an increase in man-hour productivity in nine of the industries included, ranging from 1% for the iron and steel industry to 12% for the cement manufacturing industry.

All of the 11 industries showed decided increases in man-hour productivity of labor between 1914 and 1927. These ranged from nearly 25% for the boot and shoe industry to more than 290% for the rubber-tire industry.

In four of the industries it was possible to carry the index numbers back as far as 1899, and in three others as far as 1904. The index numbers for the census years earlier than 1914 are, however, only general approximations of the productivity situation

and not so clearly representative.

In this study the progress of industrial production has been measured by man-hour output in preference to output per worker. There have been material changes in the daily or weekly working hours from time to time, such as the reduction from the 12-hour day to the 8-hour day in the iron and steel industry in 1923, so that a worker is not a fixed unit of measurement from one year to another. A man-hour, however, remains a constant and unvarying unit at all times, and can therefore be used as a consistent measurement for all periods.

The indexes here given take no account of the causes of changes in output per man-hour. The term "man-hour productivity of labor" must not be confused with the term "labor efficiency," and the changes shown should not be attributed solely to the increased productive ability or capacity of the workers. Although that factor has, without doubt, played an important part in the higher productivity, many other factors are also involved, such as application of mechanical power, improvements in machinery, processes, or management, and elimination of waste, any one of which, or any combination of which, might effect changes in an industry. The index numbers merely show that changes have taken place, and to what extent; they do not point out the origin of the changes.

While they cover a wide range of industrial conditions, they can not be considered representative of the entire manufacturing field.

Direct comparisons, based on these index numbers should not be made without considering other elements that might influence the trend of labor productivity. Very great increases in man-hour productivity were, for example, experienced in the automobile industry and the rubber-tire industry, while in the boot and shoe industry and the slaughtering and meat-packing industry the gains were comparatively insignificant. The automobile industry and the rubber-tire industry, however, scarcely existed in 1899. The rapidly growing demand for their products created an intense development within a short period of time and resulted in enormous increases in labor productivity. On the other hand, the boot and shoe industry and the slaughtering and meat-packing industry were already well developed in the early years included in this study. High levels of productivity had been reached, the technique of the industry had been developed, and the demand for the products was fairly stable. Consequently these industries could not be expected to show such remarkable increases in labor productivity.

# Rock Products Plants—Details of Design and Equipment

## Part II—A Screening Problem

By Hugo W. Weimer

Consulting Engineer, Milwaukee, Wis.

**M**ANY PROBLEMS that appear insignificant must be solved by the plant operator in order to accomplish desired results which may be to increase efficiency, eliminate trouble, provide some product desired by a customer or keep one step ahead of competition. Naturally engineers like the writer are occasionally called upon to give their opinion as to a possible solution, and a recent example that came to the writer's attention will be explained and illustrated in this article because it was rather unique and will undoubtedly be of interest to many readers.

The requirements were that a single unit, preferably a rotary screen, be so designed and equipped that it could receive a mixed feed and separate all material less than  $\frac{1}{4}$ -in. in size, separate and wash all material

plus  $\frac{1}{4}$ -in. and minus 1-in. in size, and separate only all material larger than 1-in.; and at the same time not have the necessary wash water come in contact with the material less than  $\frac{1}{4}$ -in. or more than 1-in. in size.

To accomplish this desired result in a single unit the writer submitted two plans that, at least theoretically, would function. The problem, as the reader will no doubt have observed, is to wash an intermediate size without having water come in contact with either the larger or smaller sizes of material.

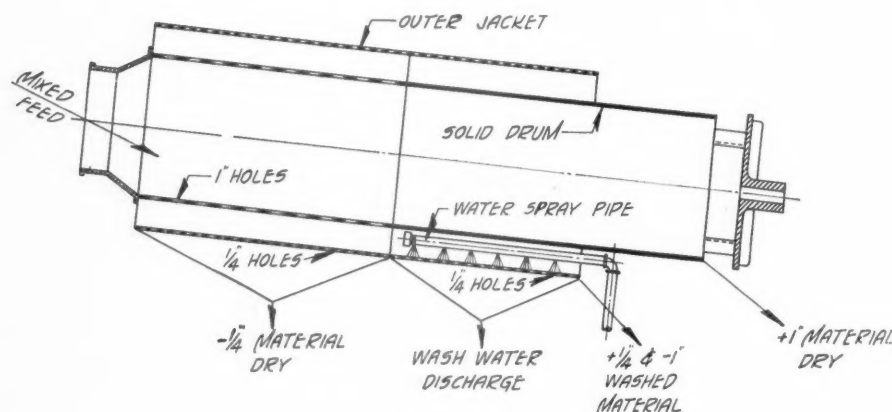
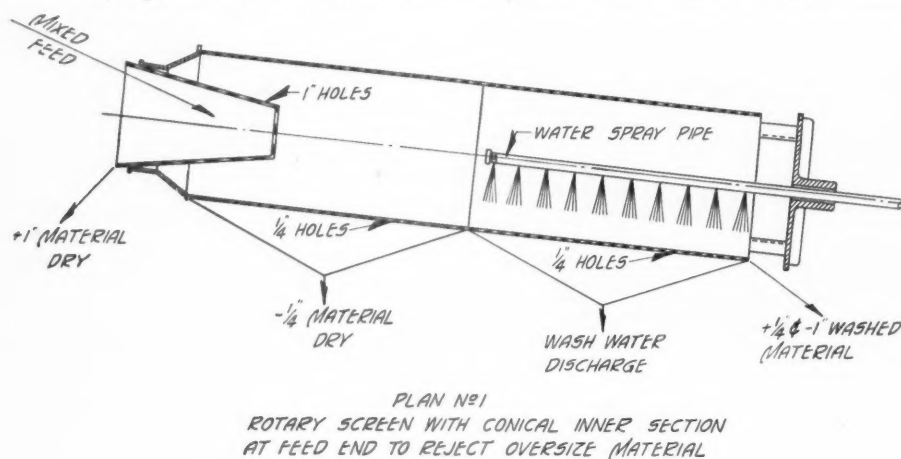
Plan No. 1 shows a method whereby a conical inner screen is fitted in the feed end of a cylindrical screen, which would eliminate all material over 1 in. The first half of the main drum of the rotary screen would be perforated to eliminate all material minus

$\frac{1}{4}$ -in. in size. Up to this point we would therefore have separated the material so that whatever passes farther through the main drum would only be of such a size that would require washing. Therefore, in the second half of the main drum we would introduce water through a spray pipe, which would wash the material and permit the wash water to be discharged into a flume; and the washed material, which is of a size  $\frac{1}{4}$  to 1-in., to pass over the discharge end of the screen.

Theoretically, this plan appears to be very satisfactory and there is no mechanical reason why this screen should not work satisfactorily other than the fact that the small conical screen fitted into the feed end of the rotary screen may not have sufficient area to work efficiently, and also the fact that the original feed may require some mechanical means to be properly discharged at the inner end of the conical screen. To accomplish this a screw conveyor or some other method may have to be employed.

Plan No. 2 is again a method whereby a single rotary screen will accomplish the desired results by the addition of an outer jacket. Not only must an outer jacket be used, but furthermore, a portion of the inner drum must be made of solid plate in order to function properly. At the feed end of the screen the mixed feed is received and the first half of the main drum has 1-in. perforations permitting all of the material that would pass through these holes to pass on to the outer jacket. Any material larger in size is carried on to the second half of the main drum, which consists of a solid plate and is merely a means of conveying this material to the discharge end of the rotary screen. The first half of the outer jacket would have  $\frac{1}{4}$ -in. openings and would separate, in a dry state, all material less than  $\frac{1}{4}$ -in., and pass on to the second half of the outer jacket the material that is plus  $\frac{1}{4}$ -in. and minus 1-in. in size, where it would be subjected to a water spray to accomplish the washing required.

From a practical point of view there is no question in the writer's mind but that the second plan would be the most feasible as far as efficiency is concerned, and mechanically the writer would not hesitate to say the same. In either case the necessary wash water does not come in contact with any material other than the size required



PLAN NO. 2  
ROTARY SCREEN WITH OUTER JACKET  
AND HALF OF INNER DRUM OF SOLID PLATE  
**Two possible solutions of a special screening problem**

to be treated in this manner, which is one of the requirements in this problem.

While it is true that preliminary screening would have furnished a simpler solution, this was not to be considered, and the writer's intention in illustrating and describing this problem was merely to show that often times a novel arrangement of some existing unit in a plant can be modified to accomplish some desired result.

### New Gravel Developments Projected on Hudson River

INDUSTRIAL ACTIVITY is again appearing north of Haverstraw, N. Y. The Hudson River Gravel Corp. has taken over the Allison sand bank just west of the Penney bridge. It has also acquired extensive property rights in Jones Point and in Verplanks Point.

This company is one of the largest dealers in building materials in New York City. It owns or operates over 50 gravel and sand banks between New York and Albany along the Hudson River.

At Grassy Point, the plan is to remove the buildings which now stand on the bank between the railroad and the tide water inlet to Beaver Pond Brook. The Penney bridge is to be relocated and the approach from the railroad will be straightened out and a retaining wall constructed to hold the road in place.

The gravel company plans on putting in extensive machinery to mine the gravel and sand and supply it to barges along the river.

At Jones Point, the plans are still more extensive. The company has acquired the right to take gravel and sand from all the extensive banks in that territory and it is thought to have acquired the rights to a quarry behind Dunderburg. A tunnel under the new state highway is being planned to allow the company to remove its material to the river front.—*Haverstraw (N. Y.) Times.*

### New Cement Mill for Mexico

ACEMENT PLANT at Hermosillo, Sonora, Mexico, is in process of construction. The plant will cost in the neighborhood of half a million dollars. The MacDonald Engineering Co., with offices in Chicago and San Francisco, has charge of construction. The plant will have a daily capacity of 500 bbl. The mill is to be owned by the Cemento Portland Nacional, S. A., of which Governor Francisco S. Elias of Sonora is president, Ricardo Durazo, vice-president; J. M. Almada, treasurer, and C. V. Escalante and Gaspar Zaragoza, directors. Albert Gayou is a stockholder.—*Tucson (Ariz.) Citizen.*

## Australian Gravel Plant

FOR over 50 years the gold bearing areas in the vicinity of Victoria, Australia, have been prospected; the whole territory is honeycombed with shafts sunk by miners in the search for gold. Now the same area is being reworked for gold—not for the mined gold, but the gold which ensues from the sales of the gravel discarded long ago when only the crudest of mining methods prevailed. At Smythesdale, B. G. Nicholl has installed a slackline excavator plant of 600 cu. yd. per 8 hr. capacity and is removing the gravel for concrete aggregate purposes. The mast is 75 ft. high and a 1½ cu. yd. dipper is used. This installation is reputed to be the first of its kind in Australia.

The Nicholl holdings comprise about 1200 acres and are covered by six gold mining leases. There is no overburden, the gravel beds ranging from 15 to 150 ft. in depth with an estimated content of over 50,000,000 cu. yd. There is about 10% clay present in the material. The gravel is not hard packed

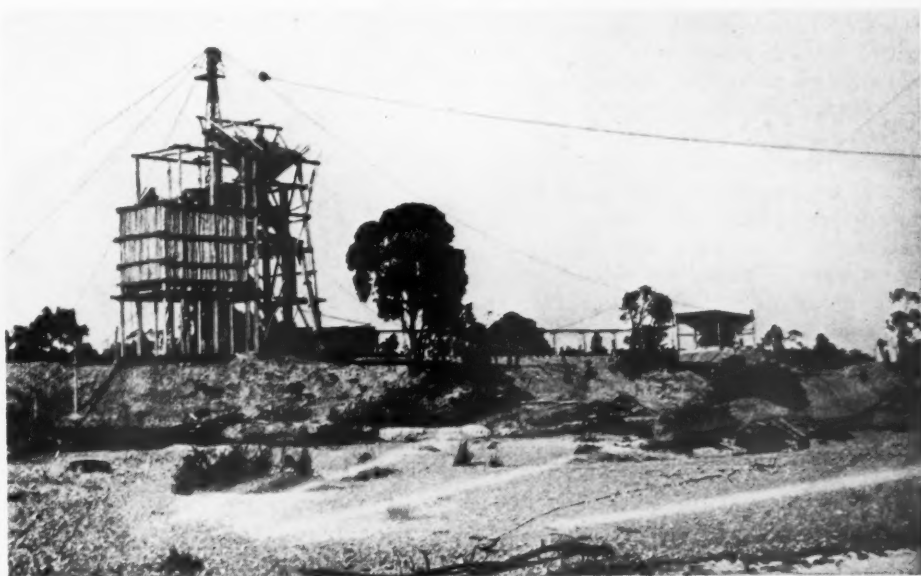
city is \$4 per ton. Mr. Nicholl believes that a better rate will be granted after his output has been increased.

### New Slag Producer in Cleveland Territory

JAMES L. E. JAPPE, publicity agent for the Republication organization in Cuyahoga county and campaign manager for the candidacies of Carmi A. Thompson for governor of Ohio, has gone into the slag business.

Mr. Jappe is manager of the Ohio Slag Co., with offices at 1213 A Terminal Tower Building. According to Mr. Jappe, the company is headed by A. A. Read of Pittsburgh and all other officers of the firm are Pittsburghers.

The Ohio Slag Co. recently made its first bid and was awarded its first contract from Cuyahoga county. Its bid of \$1.40 a ton for 3600 tons of slag was accepted.



Former gold fields now yield gravel profits

and does not require any blasting to loosen. For concrete aggregate, the deposit material is said to run in about the right proportions for use without further mixing. An assay is said to have shown the material to carry 28 c. worth of gold per cu. yd., clean and free and 90% recoverable by mechanical means and the rest by the cyanide process. In this country there are several gravel operations, principally in California, where the recovery of gold from the regular production of aggregate has been a profitable issue.

The main railway line from Melbourne, a city of about 1,000,000 inhabitants, runs through the Nicholl deposits and the main highway is quite close. There is a freight rate of \$2.50 per ton from the deposit to Melbourne, a distance of 87 miles, but the price of washed and graded gravel in that

It was pointed out that the price per ton is 20 cents lower than the last contracted price and almost 40 cents below the bids of a year ago. Among contractors the price of \$1.40 per ton is considered significant, as it establishes a precedent in costs for the season.—*Cleveland (Ohio) Press.*

### Wagner Quarries Get Big Stone Contract

THE Wagner Quarries Co., Sandusky, Ohio, announced April 2 receipt of an order of 1,000,000 tons of crushed stone for delivery to Detroit and adjacent Michigan ports during the navigation season.

The first cargo is to be shipped on the freighter *Sierra* this week. The company has orders for 3,000,000 tons booked.

# Power Factor in Rock Product Plants

By Hendley N. Blackmon

General Engineer, Westinghouse Electric and Manufacturing Co.

CONSIDER FARMER BROWN and his mule.

Strangely enough, the basic principle of power factor in rock products plants has quite a bit in common with this farmer who uses a canal to carry his produce to market. Try as he may, his towboat never gets a full mule-power out of the beast on the tow-path. And, though the farmer doesn't know it as such, it is all because the mule has a "low power factor" with respect to the boat.

A glance at Fig. 1 (A) of the loaded towboat and the mule shows exactly what happens. Suppose the mule is walking quite a distance from the edge of the canal, and the length of the tow-line represents one mule-effort. The simple diagram of forces acting on the boat shows that a large part of the mule's effort is wasted in pulling the barge toward the bank instead of to market. The boat's rudder offsets this bankwise pull of the tow rope to keep the boat in the middle of the stream, and in so doing slows down the boat's progress. Power factor is analogous to the measure of useful work transmitted from the mule on the tow-path to the boat on the canal. The simple sketches for the mule and boat represent ordinary alternating-current, electric-power circuits in your plant.

But what a difference in useful work, if the mule walks along the edge of the canal and puts forth the same effort. In Fig. 1 (B) the pull of the tow-rope is more in line with the load, so that less of the one mule-power is spent in pulling the barge shoreward, and more used to drag the produce to market. Increasing the useful effect of the mule's effort in this way is something like raising the electrical power factor in your rock products plant.

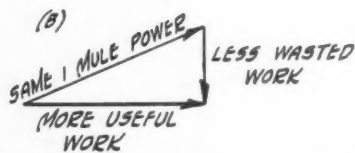
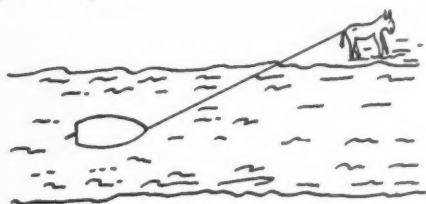


Fig. 1 (B). Increasing the useful effect results in improved power factor

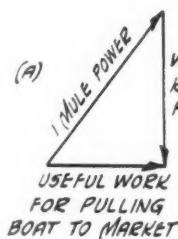
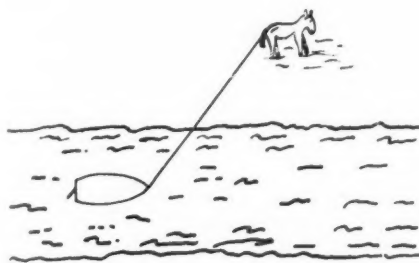


Fig. 1 (A) Illustrating poor power factor

If it was possible to have an overhead tow-path directly above the tow-boat, then all the mule's effort would be useful—i.e., 100% power factor.

With a mule on both banks, as in Fig. 1 (C), the shoreward tendency is nulled and the second mule also helps pull the boat to market. This condition is similar to adding a synchronous motor to your electrical circuit, thereby correcting the power factor and also mechanically driving a crusher, or other machine, with the same motor.

After all, power-factor is merely a measure of the "loafing current" in your electrical circuits. Since power is proportional to the current, solving the power-factor problem is simply determining the right-angle triangle which represents the total current flowing, the working current and the idle current (Fig. 2).

The power factor at any point in the plant can be found by comparing the product of the voltmeter and ammeter readings with that of a wattmeter connected at the same place:

$$P. F. = \frac{\text{Wattmeter Reading}}{\text{Product of Volts} \times \text{Amps.}} = \frac{\text{True Power}}{\text{Apparent Power}} = \frac{\text{Kw.}}{\text{Kv-a.}}$$

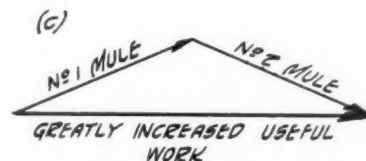
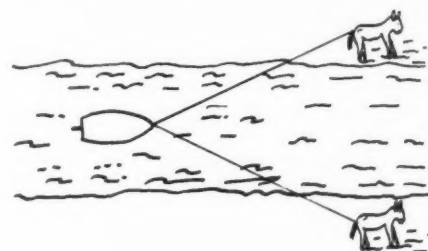
For 3-phase current the product of volts times amperes must be multiplied by 1.73 to give total Kv-a., or apparent power.

Since power factor is nothing more than the ratio between true power and apparent power, it is expressed in per cent. Thus, 80% P. F. means that 80% of the apparent power (hypotenuse of the triangle) is doing useful work, as shown by the "in-phase component" of the energy. (Base of the triangle.) This numerical ratio (0.8) between base and hypotenuse corresponds to a 36

deg. angle. Trigometric tables, under cosines list the angle corresponding to any numerical ratio.

In the early days of the industry, when almost all of the a.c. power generated was used for lighting, there was no power factor problem. Incandescent lamps have 100% power factor. It appeared with the induction motor, which rapidly became the dominant electric power load because of its low cost, reliability and simplicity. Today underloading induction motors is the chief cause of low power factor in rock product plants. The interaction of magnetic forces inside an induction motor give it the ability to do work. Current feeding the motor splits to do two jobs; one part sets up the magnet fields, and the rest forms the "power current" for actually doing the work.

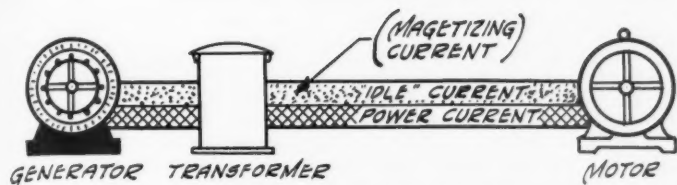
It is the magnetizing current that causes low power factor. Although it serves a useful purpose in exciting the motor, this mag-



Figs. 1 (C) and 2 (below). Simple illustration of how power factor is corrected

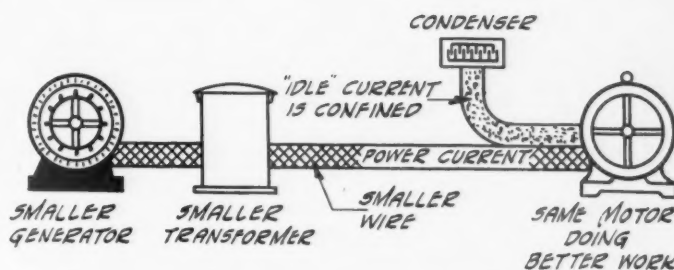
netism has a property very much like a flywheel. It takes power to build up the magnetic fields, just as it takes power to bring a

flywheel up to speed. When the magnetic field collapses, it returns power to the electrical circuit in the same manner that a flywheel gives up power when brought to rest. This continual building up and destroying of magnetic fields in the induction motor, due to the periodic reversals of current in the a.c. system, produces current which flows back and forth between the motor and the power house. This surging current is not "true power" since its net flow in a given direction is zero. The same amount of



ORDINARY PLANT CONDITIONS:  
THE "IDLE" CURRENT IS HALF AS BIG AS  
THE CURRENT DOING USEFUL WORK.

Fig. 4. Ordinary plant conditions



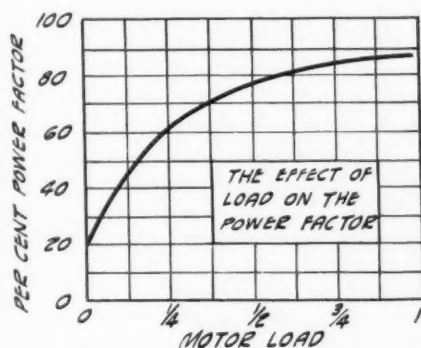
WHAT HAPPENS WHEN A CAPACITOR TAKES  
CARE OF THE "LOADING" CURRENT.

Fig. 7. Plant conditions after installation of capacitor

power that magnetizes the motor's field in  $\frac{1}{2}$  cycle is returned the next  $\frac{1}{2}$  cycle when the magnetic field collapses with the reversal of current. Wattmeters, therefore, do not register magnetizing power but only the flow of working current times the voltage. This active power (kw.) never returns to the source but is consumed in the motor for driving a mixer or crusher.

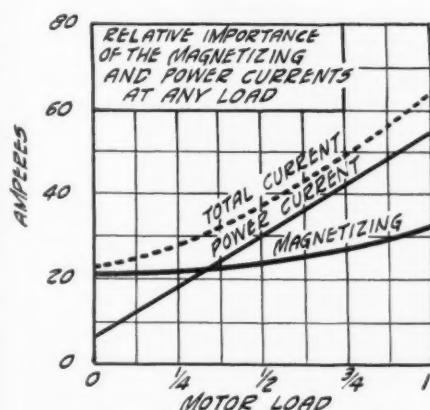
The exact amount of magnetizing current depends on the size of the induction motor and the intensity of its magnetic field. The flow of power current depends only on the load and the losses of the motor (see Fig. 3).

At light load, the induction motor's power factor is about 20%; at full load it rises to



THE POWER FACTOR OF AN INDUCTION MOTOR GOES UP AS THE LOAD GETS BIGGER.

Fig. 5. Effect of load on the power factor



AT LIGHT LOAD, THE "IDLE" (MAGNETIZING) CURRENT OF AN INDUCTION MOTOR IS MUCH LARGER THAN THE POWER CURRENT.

Fig. 6. Showing raise in power factor due to static condensers

85% (see Fig. 4). When idling, the magnetizing current may be four times the power current, whereas at full load this exciting current is only half as much as the power current (Fig. 5). It is interesting that an induction motor can never itself have

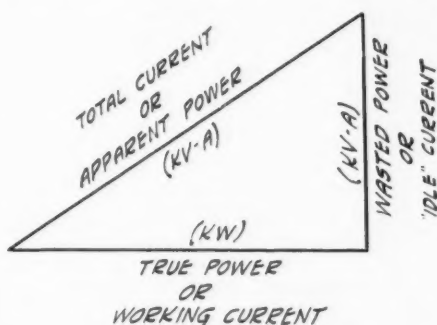


Fig. 3. Power triangle

100% power factor—no more than the farmer's mule can have a tow-path directly down the middle of the canal.

Obviously the wires, transformers, circuit breakers, generators, etc., must carry this sizable "work-less" magnetizing current in addition to the work current. In

brief, this means either greater investment by the power company (and higher rates for customers) or else an overloaded line with

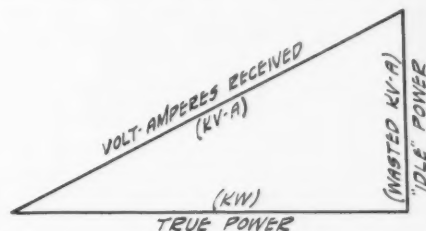


Fig. 8. Diagrammatic method of determining existing conditions in a plant

resulting loss of torque and speed in the motors of your plant. In other words, central station equipment carrying a low power factor load feel the same awkwardness that besets the mule when he wanders too far from the canal bank and has to walk more or less sideways, instead of straight ahead.

Static condensers are a common way of raising the power factor in a rock products plant (see Fig. 6). A static condenser, by virtue of its electrical elasticity, when connected near an induction motor will supply

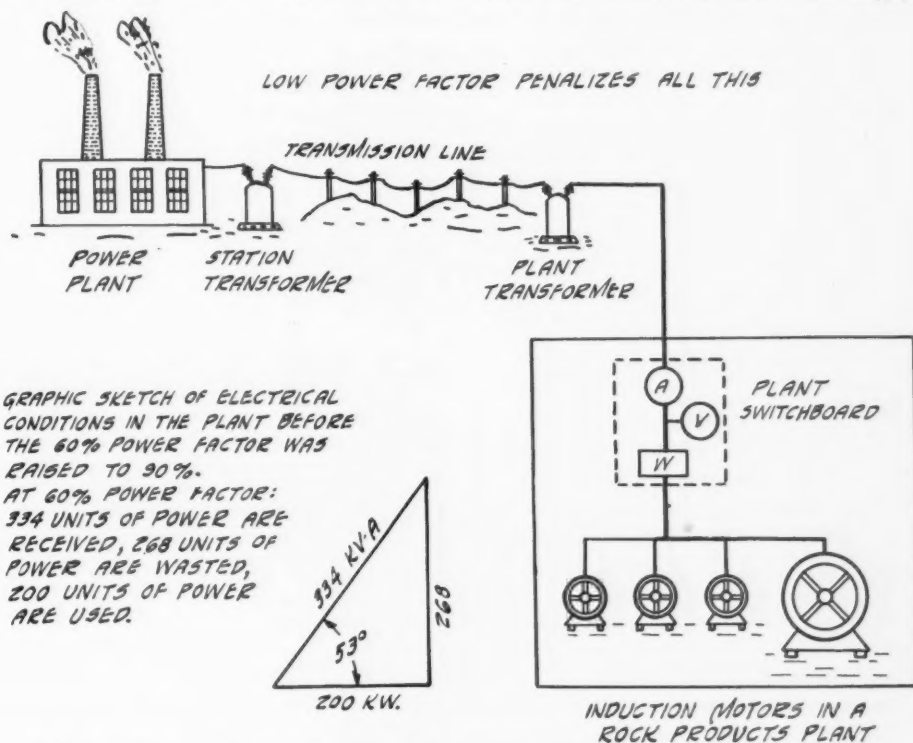
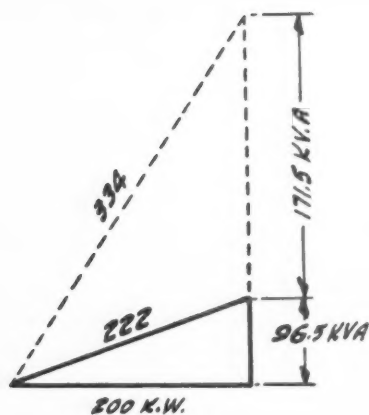


Fig. 8a. Illustrating electrical conditions in a plant before raise of power factor



**SAME PLANT WITH 90% POWER FACTOR**  
**THE TRIANGLE HAS SHRUNK UNTIL NOW.**  
**222 UNITS OF RECEIVED POWER DO THE SAME WORK AS THE 334 FORMERLY TAKEN.**

Fig. 9. The same plant as in Fig. 8a after the power factor has been raised to 90%

the magnetizing current, thus freeing the transmission generating equipment of that non-productive burden. The capacitor (condenser) acts as a sponge—it absorbs and delivers an electrical charge. The power factor of the motor itself remains unchanged, but the power-factor from the capacitor back to the power house is helped. In the  $\frac{1}{2}$  cycle in which the motor's field collapses, the power returned to the circuit is absorbed by the capacitor, and during the next  $\frac{1}{2}$  cycle, the capacitor discharges this same power to magnetize the motor fields—something like two boys playing catch. The power loss in the capacitor itself is negligible; about one-fourth of 1 per cent. Another way of supplying this exciting current locally and relieving the central station apparatus is by using a synchronous motor, which not only raises the power factor but carries mechanical load at the same time.

Since the electrical conditions in the plant, as a whole, or at any one point, can be represented by a right-angle triangle, a glance at the typical sketch (Fig. 7) shows what can be done to improve the power factor.

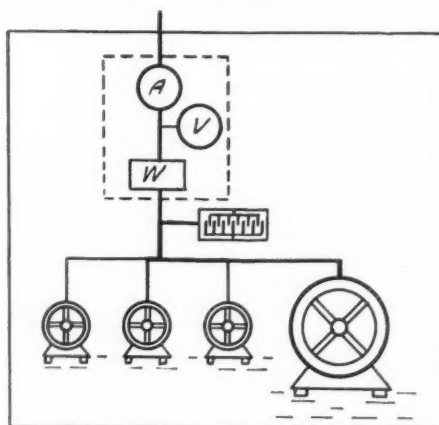
(1) The side representing "idle" current can be shortened by adding capacitors, synchronous condensers, or synchronous motors.

(2) The base, representing "true power" can be increased by loading up the under-loaded induction motors and adding a 100% P. F. synchronous motor.

(3) A combination of (1) and (2).

Suppose for example we want to find the power factor of the rock products plant shown in Fig. 8, which has three small induction motors and one large induction motor.

On the plant switchboard, the voltmeter reads 440 v., the ammeter reads 443 amp., which makes the total 3-phase "received



power"  $\frac{1.73 \times 440 \times 443}{1000} = 334$  Kv-a., and the wattmeter reads 200 kw., therefore the power factor of the plant  $\frac{\text{kw. } 200}{\text{Kv-a. } 334} = 60\%$ .

(From trigometric tables 0.6 is the cosine of a 53 deg. angle.)

Laying these figures out to scale separated by a 53 deg. angle gives the triangle in Fig. 8, which shows the existing conditions in the plant.

The wasted power can be "scaled off" or easily figured.

Wasted power  $= \sqrt{334^2 - 200^2} = 268$  Kv-a.

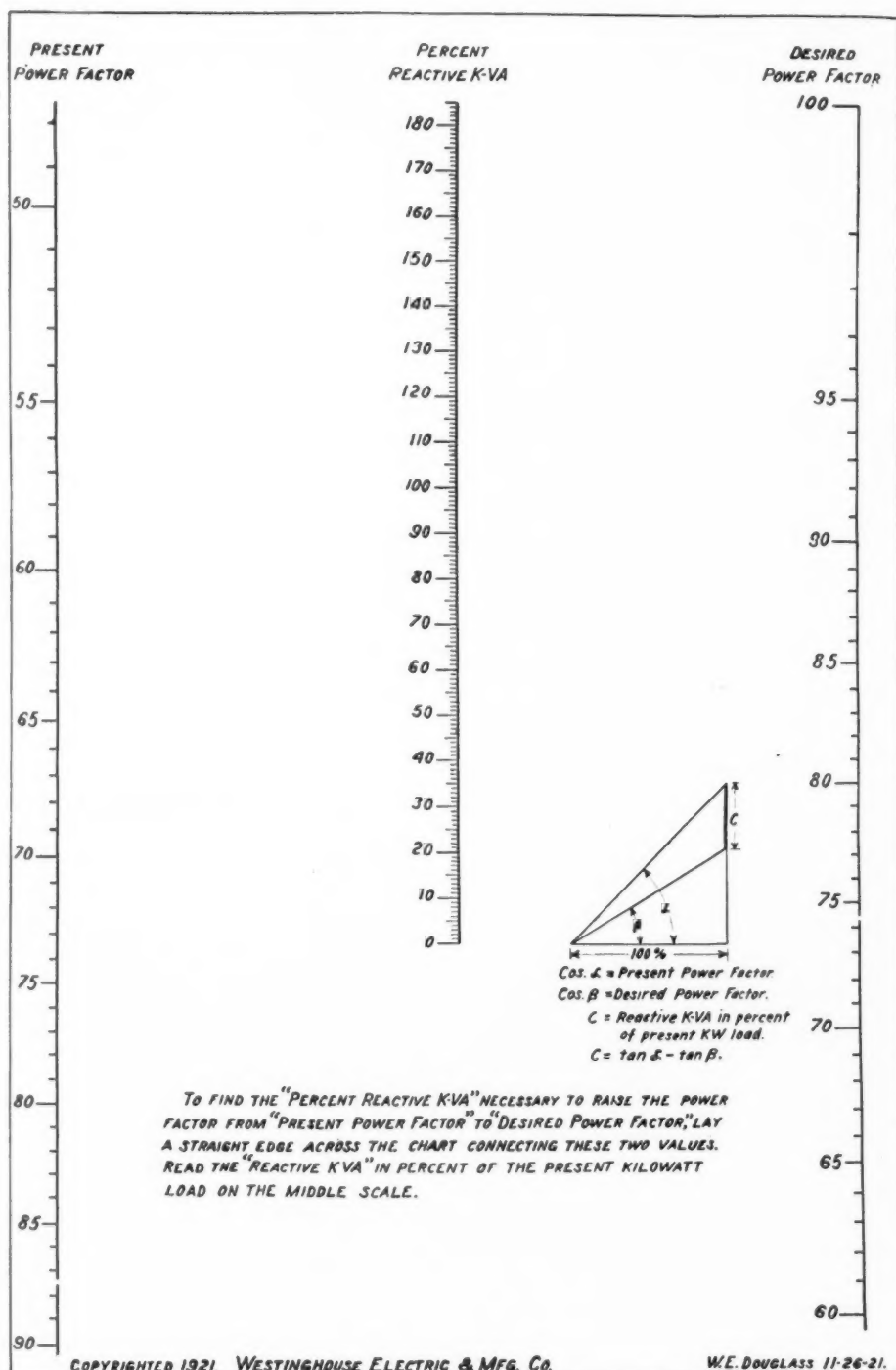


Fig. 10. Chart for use in determining the per cent. reactive kv-a. required to raise the power factor to a desired value

If the plant electrical engineer decides to raise the power factor to 90% he merely figures how many of the wasted Kv-a. must be gotten rid of.

To still carry 200 kw. load at 90% P. F., the Kv-a. input (hypotenuse) would only have to be  $\frac{200}{0.9} = 222$  Kv-a. (instead of 334).

Laying this out to scale and swing it (from pt.0) toward the base of the triangle until it meets the "wasted power" line. The old triangle has shrunk to that shown in Fig. 9.

The 171.5 Kv-a. of wasted power absorbed by the capacitor installed at the plant and the 96.5 Kv-a. of idle power remaining can be scaled off directly. Or be figured by: Wasted power at 90% P. F. =  $\sqrt{222^2 - 200^2} = 96.5$  Kv-a.

Amount corrected by the capacitor is  $268 - 96.5 = 171.5$  Kv-a.

Using the nomograph in Fig. 10 this same problem is quickly solved.

The plant has 60% P. F. and wants 90%. A line connecting these two values on the chart crosses the "per cent reactive Kv-a. scale" at 85%.

The "working power" in the plant, as given from the wattmeter, is 200 kw. Therefore, the amount of wasted power which must be cared for by capacitors is  $0.85 \times 200 = 170$  Kv-a. (which checks with 171.5 Kv-a. figured).

(Another article will explain in detail just how the power factors in the lime plants of the Ohio lime hydrate district were improved and power costs lowered by the application of the principles explained in the foregoing article.—Editor.)

so written their specifications.

The above departments require the material to be delivered to the stockpiles of the jobs separated as follows: Gravel No. 1, Gravel No. 23 and Gravel No. 4, and Concrete sand. These are in turn placed in separate bins and proportioned out by weight. This gives the engineer a very accurate control of the mix and eliminates the segregation which was so apparent in the stocking of one size of coarse aggregate. We still have a few places where one coarse aggregate is required, so we produce Gravel No. 123, which is made by combining the Gravels No. 1, No. 2 and No. 3. This has always been more or less unsatisfactory owing to the segregation and not having any really accurate method of combining at the plants; and we believe with the results and advantages of the new method that it will soon be adopted throughout this section.

The specifications in this section use round openings for all testing screens larger than  $\frac{1}{4}$  in. Below that standard Tyler sieves are used.

## Standardizing Aggregate Sizes and Nomenclature in Los Angeles

By Harry D. Jumper

Specification Engineer, Consolidated Rock Products Co., Los Angeles, Calif.

I HAVE READ with a great deal of interest the report of the sub-committee for standardization of commercial sizes of crushed stone of the National Crushed Stone Association in the February 1 issue of ROCK PRODUCTS, and find that the stone industry in the East is confronted with very much the same problem of standardization of sizes and a suitable nomenclature to designate these sizes as we were in southern California.

In March of 1929 a merger of the three leading rock, gravel and sand producing companies in Los Angeles, having a production of 10,000,000 tons per year, took place, and the necessity for a standardization of sizes and names for these sizes to be known by was very apparent. At the time of the consolidation these companies were producing as many as 22 different products, which, if happening to be of the same size and grading as one of the other companies, was known by a different trade name. This, of course, caused untold mistakes in the taking of orders and in the deliveries of orders after the merger. We realized it would be a difficult task to change the consumer who had been used to ordering for many years by some trade name, so we decided to spend our efforts on the engineers and architects in charge of writing specifications.

Our first step was to get a copy of the existing specifications of the various municipalities, county and state highway commissions, also of private consulting engineers who were handling large work. These we took and made a very careful study of and charted the various screen analyses called for. We found from this study that by producing certain material of a given screen analysis we could fill the requirements of at least 95% of all work, and felt that by a little educational procedure among the others, showing the results obtained, we could soon eliminate the use of other specific sizes.

The next move was a suitable nomenclature to be used, and we decided the system of numbers was best. The chart shown below was drawn up and is now being used with excellent results.

From the above numbering and grading the reader will notice the coarse aggregates for cement concrete are distinctly separated. This move was started and promoted by ourselves not only because it is the most satisfactory and economical method for us from a production standpoint, but from the engineering standpoint of control of concrete mixtures. The California State Highway Commission had previously proved the value of this method, and now the county and city of Los Angeles and other municipalities have

### Boy Scouts Find Quarry Interesting

THE two troops of Boy Scouts in Sylvania enjoyed a day of recreation and education recently, when, with their leaders they spent the day at Medusa Portland Cement Co. at Silica, Ohio, under the guidance of Charles Miller.

The boys conducted a search for trilobites and Mr. Miller taught them something of the rock formations where these fossils are. Mr. Miller has a collection of these trilobites on display in Sylvania.

The collection of fossils found by Mr. Miller in this section has brought him international prominence, and is said to be one of the finest collections in the world.—Sylvania (Ohio) Sentinel.

### Building Science Abstracts

SUMMARIES of current literature on production and testing of building materials and other papers of interest to the construction industry are being published monthly by the Department of Scientific and Industrial Research, 16 Old Queen street, Westminster, S.W. 1, England. Articles appearing in the principal journals covering these industries are given in brief abstract in each issue, copies of which may be had at a price of 9d. (18c.) each.

Crushed Rock No. 1.....	4- to 1½-in.	= Bituminous macadam, waterbound macadam and sewage disposal
Crushed Rock No. 2.....	1½- to ¾-in.	= Bituminous macadam, railroad ballast, asphaltic concrete, cement concrete
Crushed Rock No. 3.....	1- to ¾-in.	= Asphaltic concrete, cement concrete, bituminous macadam
Crushed Rock No. 4.....	¾- to 10-mesh	= Asphaltic concrete, road surfacing, bituminous macadam, roofing
Crushed Rock No. 5.....	¾-in. to dust	= Filler for bituminous macadam, fine aggregate for cement pipe and tile
Gravel No. 1.....	2½- to 1½-in.	= Aggregate for cement concrete heavy work
Gravel No. 2.....	1½- to ¾-in.	= Aggregate for cement concrete work, tunnels and bridges
Gravel No. 3.....	1- to ¾-in.	= Aggregate for cement concrete, lighter construction buildings, etc.
Gravel No. 4.....	½- to 10-mesh	= Aggregate for cement concrete pipe and tile, bridge railings, etc.
Gravel No. 123.....	2½- to ¾-in.	= Coarse aggregate for cement concrete
Gravel No. 23.....	1½- to ¾-in.	= Coarse aggregate for cement concrete

NOTE: Allowable tolerance 10% coarser and finer. Concrete sand =  $\frac{1}{8}$ -in. sq. Plaster sand = 4-mesh. Asphaltic sand = 10-mesh.

# Mining Practice of Interest to Nonmetallic Mineral Producers

Recent Publications of the U. S. Bureau of  
Mines Abstracted for Rock Products Producers

By J. R. Thoenen

**T**HE GROWING PRACTICE of using underground mining methods to mine limestone, gypsum and other rock products gives interest and value to recent reports on metallic mining to producers of rock products. I have abstracted some of these reports with that end in view.

**Mining Practice at Morenci Branch, Phelps Dodge Corp., Morenci, Ariz.** This paper was written by McHenry Mosier and Gerald Sherman, consulting engineers to the U. S. Bureau of Mines, and published as Information Circular No. 6107.

The orebody now being mined is in a fracture zone and has no definite walls. Limits are determined by assays. All permanent openings in the mine require timbering. The orebody is roughly 2000 ft. long by 600 ft. wide and 1000 ft. deep.

Exploration at first was sporadic and unsystematic in search of high grade ore. Later as the low grade ore became valuable systematic and careful exploration was carried on. This was necessary because in operating a mine by the caving system a large part of the expense is incurred before production begins. This required many underground drifts and raises.

Since caving once started, cannot be stopped, there is little chance for selective mining and therefore the entire orebody was very carefully sampled and tested prior to mining. The sampling and testing methods are described in detail.

The Humboldt mine is worked through three shafts and has two adits. One shaft is used to hoist ore, another to handle men and supplies and the third for waste. All shafts are in the walls so as not to be affected by the caving operation.

Development work is planned far enough ahead so that one operation does not interfere with another. Miners are given two or three faces to work so they are never held up by the muckers.

In drilling drift rounds the V-cut is used and care is taken to see that the cut holes meet to insure simultaneous detonation. The spacing and direction of holes are all standardized, different standards being used for different kinds of ore or rock.

The amount, distribution and grade of

## Editor's Note

**WE** are giving considerable space to these reviews—and they will be a more or less regular feature of **ROCK PRODUCTS**. Our reason is twofold: There are already numerous mining operations in our industries, and operators of these mines will find interest and value in comparing methods and costs. Also operators of quarries will find interest in comparing methods and costs with their own operations. There is apparently much to be learned about open-pit quarrying when an underground mine can be operated to produce rock ore at 30 c. per ton, including timbering, assaying, capital charges, etc., which are not ordinarily required in rock products operations.

It is well to point out here that this much greater perfection of mining operations over quarry operations—this greater efficiency—is in a large measure due to the publication and exchange of just such cost data as these reports contain. Thus far quarry operators have been very reluctant to divulge quarry costs or to discuss them. Until they do so freely there is little chance of attaining the same efficiency and low costs now more or less common in metallic mining operations.—Editor.

explosive is also standardized. Practically all development work is done on contract.

Mounted and unmounted drills of the jackhammer type are used throughout.

Hollow hexagonal  $\frac{7}{8}$ -in. steel is used for the drifting machines and quarter octagon for the drills in the stopes. The change in gage is  $\frac{1}{8}$ -in. for lengths of 15 in. Great care is taken in sharpening the bits so that there is no variation of over  $\frac{1}{64}$  in. in bits of the same gage.

Air pressure is maintained at 80 to 85 lb. at the drills.

Illustrating the extent to which standardization is carried in all operations, all primers are made by inserting the detonator in the side of the cartridge and securing it in place by tying or taping. The primer is always

the second stick from the bottom of the hole.

From 27 to 80% dynamite is used, depending on the character of the ground to be broken. Shift bosses order all explosives.

No. 8 detonators are used except in block holes. Both delay and instantaneous electric detonators are employed and shot by connection with the mine power lines carrying 250 volts.

All holes are tamped with sand tailings packed in paper cartridges.

Details of drift rounds, timber sets, etc., are illustrated by line drawings.

Drifts are driven on contract. Contracts are let for drilling, breaking and removing the rock and for timbering.

Mechanical shovel loading has proven economical and better in all around practice for main drifts. From February 1, 1928, and September 30, 1928, 2343 ft. of main heading was driven having a rectangular cross-section  $9\frac{1}{2} \times 10\frac{1}{2}$  ft. Nine tons were broken per foot advanced and the average daily advance was 11.3 ft. as compared to 7.3 ft. by hand-shovel loading.

Ordinarily two rounds were drilled, blasted and shoveled out in 24 hours. The time spent on each round averaged as follows:

Operation	—Time—	
	Hr.	Min.
Setting up .....	..	45
Drilling .....	3	30
Loading and firing .....	..	45
Tearing down .....	..	15
Waiting for smoke .....	..	45
Mucking .....	6	00
Total .....	12	00

An undercut block caving system is employed, which is illustrated in detail by line drawings as are the former methods. For those who are interested in this type of mining, several pages of the report are occupied with a detailed description of the method.

Some 5000 tons of ore are hauled per day in 6 and 8-ton cars pulled by electric locomotives about  $\frac{3}{4}$  mile. Trains consist of fifteen 8-ton cars or twenty 6-ton cars. Each main line train makes 9 to 13 trips per shift at approximately 6 miles per hour. The unloading time is 7 minutes.

One item of interest is that the widening of the loading chutes from 30 in. to 42 in. nearly doubled the speed of loading.

During 1928, 72% of the employees were paid on contract or bonus systems and 28% by day wages. Both contract and bonus systems are described in detail.

## UNIT COSTS OF OPERATION

Year	Tons mined	Mining		Over-all	Pounds of explosive per ton	Bd. ft. timber per ton
		Stopping	Tons per man Mine payroll			
1927 .....	1,136,339	40.35	10.0	9.07	0.24	0.23
1928 .....	1,483,984	62.76	11.84	10.45	0.19	0.15

A complete safety organization is maintained with mine rescue and first aid taught to employees.

Illustrating the capital investment necessary prior to production from the caving method of mining at the Humboldt mine the development and mining costs for one caving block containing 120,000 tons were as follows:

	Total	Per ton
Total tons in development.....	13,400	
Total shifts worked.....	2,007	
Total feet of development.....	2,520	
Total development cost.....	\$22,816.92	
Total development cost per ton.....		\$0.192
Total tramming cost.....		0.013
Total hoisting cost.....		0.007
Total cost of sanitation.....		0.001
Total cost of ventilation.....		0.003
Total assaying and sampling cost.....		0.006
Total drill and steel cost.....		0.064
Total operating supply cost.....		0.005
Total mine department expense.....		0.014

Grand total cost per ton..... \$0.303

It will be noted the development cost per ton is just under two-thirds of the total operating cost.

**Mining Magnetite in New York.** U. S. Bureau of Mines Information Circular No. 6092 describes the operations in a magnetite mine at Mineville, N. Y.

The ore deposits vary from 3 to 40 ft. in thickness lying between bedded rock. In many places the line of demarkation between ore and rock is sharp, but at other points the ore blends into the other without definite division.

Ore running as low as 25% iron is mined and mixed with material running up to 69%, the average grade being 42% iron. The crude ore is magnetically concentrated and brought up to 68% iron.

#### Drilling Costs \$3.92 Per Ft.

Surface exposures offer an easy means of exploration in the initial stages. This is followed by magnetic surveys and diamond drilling. Drilling costs have averaged \$3.92 per ft. cutting a 1-in. core. The average advance per 8-hour day has been 10 ft.

The mining method employed, open stopes with pillar support, has been a gradual evolution from the original open-pit employing hand shovels and wheelbarrows to the mechanical shovels and electric haulage.

The circular is replete with line drawings illustrating the details of mining methods. Development is through inclined shafts partly in the footwall and partly in ore with levels driven on the footwall. Shafts vary in cross section from 10 x 20 ft. to 15 x 20 ft.

#### Equipment and Methods in Sinking

Heavy Leyner type, air-driven, hammer drills are used in sinking. Drill steel is 1 1/4-in. hollow round with 14-deg. tapered cross bits. The gage interval is 1/4 in. Forty per cent gelatin dynamite is used with double taped fuse and No. 6 detonators. An average speed of 5 ft. per shift is attained with three drills.

The average cost of sinking including hoisting rock to the main shaft and equipping with track and air and water lines is \$32.30

per ft., made up as follows:

	Per ft.
Drilling and blasting.....	\$13.10
Mucking and hoisting.....	12.40
Track, air and water lines.....	4.00
Miscellaneous.....	2.80

The shafts are timbered only at the loading stations.

Main haulage levels are driven at intervals of 1000 to 1500 ft. along the dip. These are placed in the footwall adjacent to the ore; from these cross-cuts and raises are driven to the orebody. In driving these levels two drills are mounted on single screw drill columns. Drillers drill and blast a round in 5 1/2 hours and average 5 ft. advance per shift. Mechanical shovels served by electric locomotives then remove the broken rock in three hours. Four men comprise the crew, two drillers, one shovel runner and one on the locomotive. The charge is 125 lb. of 40% dynamite per round or 25 lb. per foot advanced. Line drawings illustrate the position and direction of drill holes. The average cost of driving, tramming material to the main shaft pocket and equipping with tracks, electric power, air and water lines is \$15.46 per ft., made up as follows for a cross-section of 10 x 15 ft.:

	Per ft.
Drilling and blasting.....	\$7.66
Mucking and tramming.....	4.60
Track, air and power lines.....	1.80
Miscellaneous.....	1.40

The present mining methods are illustrated by several line drawings. Levels are driven at intervals of from 30 to 100 ft. depending on local condition.

The mining of one ton of ore requires an average of 0.779 lb. of explosive.

#### Supporting the Roof

The roof is supported entirely by pillars left in the ore varying from 20 to 60 ft. in diameter spaced 50 ft. center to center. About 25% of the ore is left in pillars which

#### SUMMARY OF COSTS IN UNITS OF LABOR, POWER AND SUPPLIES

	Under-ground labor	Super-vision labor	Compression air drills, steel	Electric power	Explosive	Other supplies	Total
Development.....	\$0.061	\$0.005	\$0.015	.....	\$0.021	\$0.001	\$0.103
Stoping.....	0.164	0.014	0.113	.....	0.122	0.003	0.416
Tramming.....	0.333	0.027	.....	\$0.005	.....	0.038	0.403
Haulage.....	0.028	0.002	0.015	0.008	.....	0.012	0.065
Hoisting.....	0.105	0.009	.....	0.070	.....	0.053	0.237
Pumping.....	0.007	.....	0.012	0.004	.....	0.003	0.026
Total.....	\$0.698	\$0.057	\$0.155	\$0.087	\$0.143	\$0.110	\$1.250

will be recovered at a later date by mining by a retreating system. For shaft protection 20-ft. pillars are left each side of the shafts.

The total cost of supplying compressed air to the drills and all air-operated machinery is 10c per ton of ore recovered.

Steel consumption averages 0.125 lb. per ton of ore.

Tramming is done by 1 1/2-ton hand pushed cars delivered to 3 1/2-ton cars in the haulage levels handled by trolley locomotives ranging in size from 1200 to 3000 lb. drawbar pull.

Cars are loaded by hand, by scrapers, and by mechanical shovels, depending on local conditions. Scrapers are operated by electric hoists of the clutch type planetary transmis-

sion powered by 25 hp. direct-current motors. These are hooked up to the power line by simply connecting with one rail and the trolley.

Air-driven, dipper type shovels have proven more satisfactory than electric motor driven.

Shovels and scrapers operate at about equal costs per ton of ore loaded.

Haulage costs obtained in handling 25,988 tons over an average distance of 1032 ft. were \$0.084 per ton mile.

Record of labor at the Old Ben and Harmony mines, 1927:

Mining:	Total shifts	Tons per shift
Trammers.....	35,306	
Runners and helpers.....	16,866	
Miscellaneous.....	34,144	
Total underground.....	86,316	8.03
Total drill shifts.....	16,873	41.06
Development:		
Trammers.....	4,047	
Runners.....	2,459	
Drill shifts.....	2,226	
Total underground labor.....	92,822	7.46
Total drill shifts.....	19,099	36.27
Total trammers.....	39,353	17.60
(Total ore hoisted, 692,726 tons)		

Witherbee Sherman and Co. pay a premium to all classes of labor over and above a regular scheduled base wage. For example trammers loading less than 10 cars per shift receive the regular wage of 32c per hour. For 10 cars they receive 28c per car, for 11 cars 29c, and 12 cars and over 30c per car; cars have average capacity of 1 ton for all grades of ore.

#### Premium on Tonnage

Drillers and all other labor except trammers participate in a premium on the tons produced per man drilling. An average of 30 tons per man drilling for one month is the base. When the average drops below 30 men are paid at the daily rate, above 30 tons per man drilling the rate is 14c per ton.

The total cost of delivering a ton of ore from the Old Ben and Harmony mines to the surface in 1927 was as follows:

	Develop-ment	Mining	Total
Labor (man hours per ton)			
Breaking.....	\$0.028	\$0.236	\$0.264
Mucking.....	0.046	0.480	0.526
Haulage and hoisting.....	.....	0.193	0.193
Pumping.....	.....	0.010	0.010
Supervision.....	0.006	0.074	0.080
Total labor underground.....	0.080	0.993	1.073
Average tons per man shift.....	.....	.....	7.46
Labor percentage of total cost.....	5.28	55.12	60.40
Power and supplies			
Explosives (lb. per ton).....	1.38	0.799	0.937
Power (kw.h. per ton) (Total).....	.....	.....	10.91
1. Air compression.....	.....	.....	5.16
2. Hoisting.....	.....	.....	4.64
3. Pumping.....	.....	.....	0.26
4. Haulage.....	.....	.....	0.52
5. Tramming.....	.....	.....	0.33
Percentage of total cost.....	8.24	91.76	100.00

The paper was written by A. M. Cummings, consulting engineer, to the U. S. Bureau of Mines.

# Portland Cement Industry on the Pacific Coast

Part II—Notable Improvements Made at Quarries and Cement Mills of Operating Companies

By Walter B. Lenhart

Associate Editor, Rock Products

THE cement plant of the Calaveras Cement Co. is unique from a production standpoint, as it was the only mill out of 11 on the Pacific Coast, visited on this editorial trip, that was producing to full capacity. This condition was said to be due mainly to its favorable location with respect to several large hydro-electric and irrigation reclamation dams, now under construction in the Sierra Nevada Mountains. This plant was described in detail in the January 22, 1927, issue of ROCK PRODUCT.

The plant is located near San Andreas and is roughly 130 miles east of San Francisco. The district is more commonly referred to as the Mother Lode district, the great gold producing area of California. Active ledge mining still continues, but not by any means to the extent that it did only a few years ago.

Limestone is crushed in a 42-in. McCully gyratory that discharges to a 36-in. Jeffrey belt conveyor serving a surge bin. The bin feeds a 10-in. McCully gyratory. Crushed limestone is stored in an open storage yard over which is mounted an 80-ft. Milwaukee crane using a 3-yd. Hayward clamshell bucket. There are two special Allis-Chalmers "Compeb" mills, 8 ft. in the primary compartment and 7 ft. diameter in the secondary and 26 ft. long. At present Vorax metal balls and liners are being used. This metal has been in the process of development for several years in the mining field and is

used by several of the larger copper companies, notably the Braden Copper Co. of Chile and the Nevada Consolidated Copper Co. It is claimed that this metal will outwear any metal in the world; nor will it break, flow, spread or peen. The Calaveras Iron and Steel Co., Angeles Camp, has the California rights for manufacturing this alloy.

## Slurry Handling Methods

Of unusual interest is the method of handling the slurry, there being eight 28x40-ft. concrete slurry tanks, all hopper-bottomed, and with a basement under all the tanks. The bottoms of the silos are all interconnected to three pipe lines entering each silo, so that transfer of slurry can be effected by gravity or by means of two Allis-Chalmers, air-operated slurry pumps. Agitation is by air augmented by the slurry pumps if desired.

Slurry "pump" is a misleading name for this type of equipment, as it consists of two vertical receivers that are filled by gravity. When filled the inlet valve closes automatically and the air pressure applied to the top of the charge exactly on the same principle as a laboratory water bottle. The device is known in other industries as a "Monte Ju," "Acid Egg" and "Pressure Case," but in this case there are two cylinders automatically operated. All of the pipe lines have Nordstrom lubricated plug valves.



Crushing plant of the Calaveras Cement Co., San Andreas, Calif.

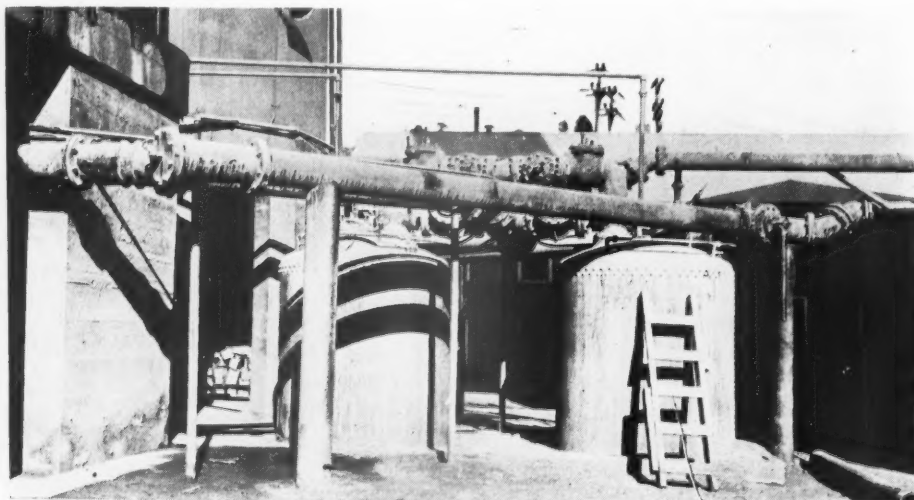
The corrected slurry is stored in Dorr agitated tanks under the kilns, with delivery of slurry to the feeders by Wilfley sand pumps. There are two 10 ft. by 11 ft. 3 in. by 240 ft. Allis-Chalmers kilns, with two 8 ft. by 71 ft. 6 in. rotary coolers that discharge to ground storage. Two Compeb mills are used for finish grinding, each driven by 650-hp. synchronous motors. Fuller-Kinyon pumps deliver the finished cement to eight 80-ft. storage silos and two interstitial bins holding 130,000 bbl.

R. Townsend is superintendent and H. J. Dunton, chief chemist.

## Santa Cruz Conducting Interesting Grinding Experiment

During the past two years the Santa Cruz Portland Cement Co.'s plant at Davenport, Calif., has been undergoing alterations and changes in method of grinding both the raw material and the finished cement that are quite wide deviations from standard practice.

This company secures its limestone from its own mine, using the glory-hole method of mining, and is securing limestone cheaply and of such quality that very little additional clay is needed at the mill to make portland cement. Two-stage grinding in the raw end has been replaced by the use of Hardinge mills with two sets of rolls as



Air lifts handling slurry at the Calaveras mill



**California Portland Cement Co.'s quarry at Colton, Calif.**

preliminary to the Hardinge mills. A more complete description of this installation will appear in an early issue of *ROCK PRODUCTS*.

#### **Oregon Portland Cement Co.**

The Oregon Portland Cement Co. operates two plants, one at Lime, Ore., and the other at Oswego, Ore. Lime is about 385 miles east of Portland and 5 miles west of Huntington, on the main line of the Union Pacific R. R., connecting Portland with Green River, Wyo. Oswego is a suburban village about 8 miles up the Willamette river from Portland.

The Oswego plant uses the wet process and was one of the early plants designed by F. L. Smidth and Co. Two-stage grinding is practiced using "Kominuters" and tube mills. The Kominuters are in closed circuit with "Hum-mer" screens. A single Vulcan kiln, 9 ft. 6 in. by 10 ft. by 210 ft., oil-fired, is used for clinker burning.

The Oswego plant of the Oregon Portland Cement Co. was one of the 17 winners of the safety trophy given by the Portland Cement Association for 1928, the plant having gone the entire year without a lost-time accident. Exercises incidental to the unveiling of the trophy were being held at the time the plant was inspected.

L. C. Newlands is vice-president and gen-

eral manager; H. R. Shipley, superintendent, and R. W. Anderson, chief chemist.

#### **Pacific Coast Cement Co.**

The most modern cement plant in the Northwest is that of the Pacific Coast Cement Co., located at 3801-E Marginal Way, Seattle, Wash. The plant was placed in operation during February of this year. A

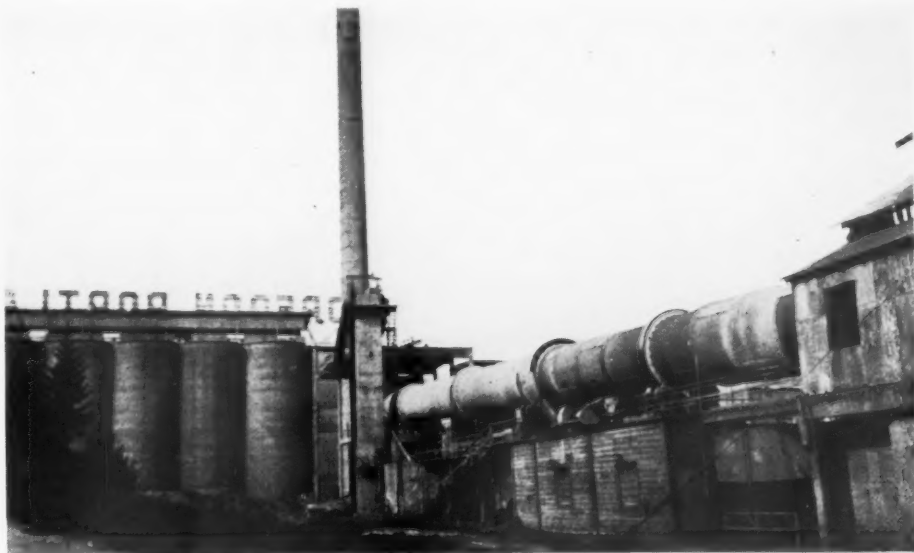
complete description of this unusual plant written by the designer, Maj. E. S. Hutton, research engineer of the Pacific Coast Co., was published in *ROCK PRODUCTS*, December 7, 1929.

#### **Northwestern Portland Cement Co.**

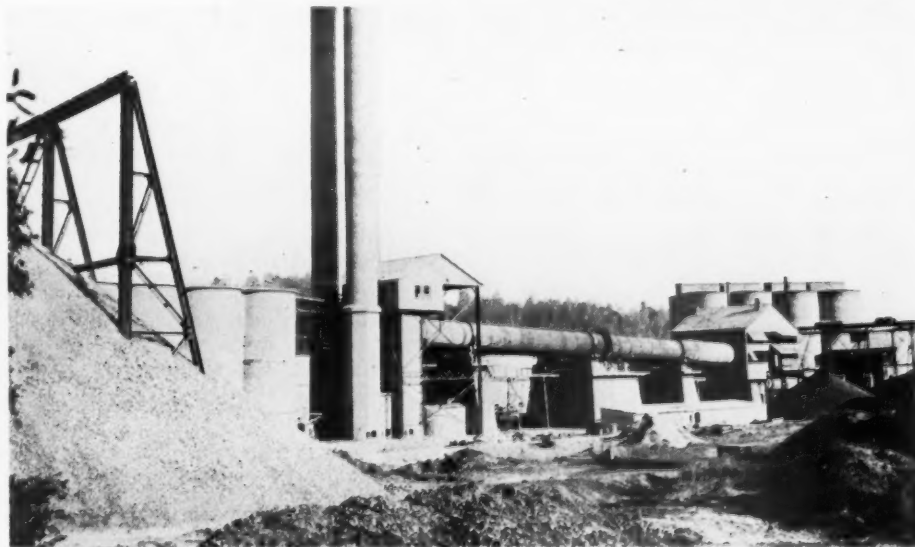
The latest plant to be built in the Northwest is that of the Northwestern Portland Cement Co. at Grotto, Wash. Grotto is practically due east of Everett, Wash., on the western slope of the Cascade Mountains. The plant is served by the main transcontinental lines of the Great Northern railroad.

The company secures its limestone from a quarry located about 1500 ft. above the plant by means of an aerial tramway. The tram was designed by the Riblets Tramway Co., Spokane, Wash. The limestone is a highly crystalline material, almost a calcite, white in color and very easy to crush. A Traylor crusher followed by a Williams hammer-mill are used for primary and secondary crushing.

Clay is taken from the company's pit a



**Oswego, Ore., plant of the Oregon Portland Cement Co.**



**Calaveras Cement Co.'s plant at San Andreas, Calif.**

short distance from the plant and after washing is delivered to the raw mill by a Wilfley pump.

The wet process is used with oil for fuel. Raw grinding is done in a combination type ball and tube mill built by Traylor, 7x40-ft. long. A single 11 ft. 3 in. by 240 ft. Traylor kiln is used for burning. The plant has a capacity of 1800 bbl. of cement per day. Power is purchased from the Puget Sound Light and Power Co.

The Northwestern Portland Cement Co. is headed by George Macdonald of Portland, Ore. C. T. W. Hollister, Seattle, Wash., is secretary and treasurer. M. G. Hess is general manager with offices at the plant. F. F. Reath is chief chemist.

#### **Superior Portland Cement Co.**

While inspecting the Superior Portland Cement, Inc., quarry preparations were be-

ing made to load a series of 8-in. well-drill holes that after shooting was expected to yield 225,000 tons of limestone. The plans for the blast included movie and movie tones to be taken of this shot which would have been one of the largest blasts ever set off in the northwest, but unfortunately one of the holes and a coyote charge exploded prematurely while being loaded killing two men and seriously injuring five others. The plans for the big shot were abandoned temporarily.

The holes on the lower bench were 200 ft. in depth and spaced 25 ft. centers with 35 ft. overburden. A coyote tunnel was also driven to insure that one part of the quarry face would be properly shattered. The holes were to be loaded with 60, 40 and 20% dynamite and exploded with Cordeau Bickford. The holes were being loaded with 1150 cases of powder, which on the estimated tonnage would give 3.9 tons of limestone per pound of explosive.

The limestone in the quarry ranges from 60 to 95% calcium carbonate, and by exercising care in the selection of the different grades of rock the amount of clay required has been reduced to about 100 tons per month for a daily production of 2000 tons of limestone.

#### **A Long Aerial Tramway**

In 1925 the company built an aerial tramway connecting the quarry crushing plant with the mill located at Concrete, Wash. The tramway was designed and installed by the American Steel and Wire Co. and uses 14 reinforced-concrete towers, with a maximum span of about 1000 ft. This installation uses 88 buckets holding 1½ tons each, that travel at 500 ft. per min. The rated capacity is 250 tons per hour. The tramway has carried roughly 1,500,000 tons of stone since starting, with practically no expense for upkeep outside of lubrication. The tram is 6700 ft. long, uses a 1½-in. carrier rope and a 1-in. run rope; and the tram at the time of its construction was one of the largest in the United States and the only one using reinforced-concrete towers. A 30-hp. motor acts as a brake and for starting. The tram replaces railroad transportation.

Preliminary crushing is done at the quarry

crushing plant, using a 42-in. Traylor crusher and Allis-Chalmers secondary crushers. A "Jumbo" Williams hammer mill has been installed near the unloading terminal of the gravity tram for further reduction of the limestone. An 11-ton Shepard overhead electric crane and a 30-B Bucyrus electric crane



**The single oil-fired kiln at the Oswego plant**

on crawler treads distribute the stone to storage.

Raw grinding is done in two Bradley "Hercules" mills and six 6x22-ft. tube mills. Clay is added at the Hercules mills as required. The tube mills are fed from an agitating trough through interchangeable nozzles. By changing the diameter of the nozzle changes in the rate of feed can be effected. The method of feeding the clay slurry, while very simple, has proven very satisfactory and quite accurate.

#### **New Correction Tanks Installed**

Recently six Minogue mechanical and intermittent, air-agitated correction tanks were built, each 36 ft. in diameter and 25 ft. deep. The agitating equipment was supplied by the Manitowoc Engineering Works. The addition of these tanks assisted greatly towards

making a more uniform quality of cement as well as to make for uniformity in plant operations.

Bellingham coal is used for fuel, which is pulverized in four, high-side, five-roller, Raymond mills. The coal is fed to the kilns by Bailey feeders. The plant has a total of six kilns; three 9x200 ft. and three 8x135 ft. Their capacity is given as 4500 bbl. per day, making this plant the largest in the northwest, and incidentally this plant is the oldest in the state.

#### **"Bottle-necking" the Kilns**

The kilns were being equipped with bottle necks at the hot end when the plant was visited, so that a deeper bed of clinker can be maintained, and to give a tighter fit between the end of the kiln and the house, so as to exclude cold air. The deeper clinker bed and improved end housings are expected to give better burning conditions and be more economical in fuel consumption. Hot air for combustion is taken from the clinker pit tunnels, through which operate the off-bearing chain drags for clinker. The kilns are lined with Ashland, Kruzite and Parco brick. No clinker brick are used.

A new General Electric switchboard has been installed in a centrally located building, and the installation modernizes the electrical features of the plant to compare favorably with more recently built cement plants.

Two-stage grinding is practiced in the finish end, using Bradley Hercules mills and tube mills.

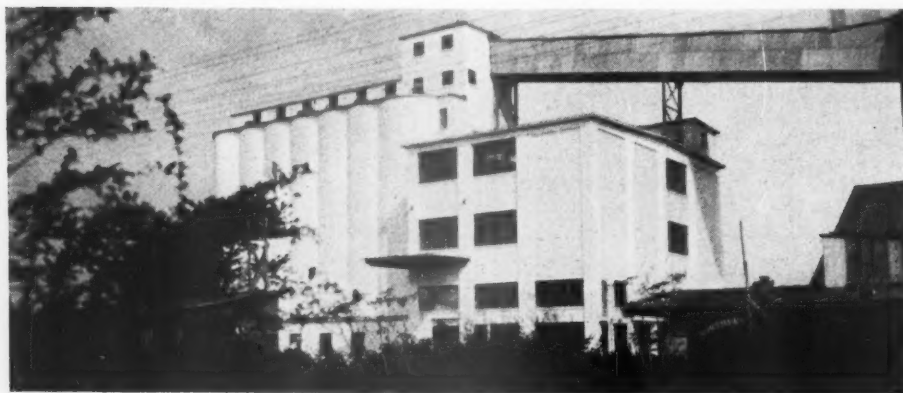
Bulk cement is shipped from the plant to Seattle and to power dam projects on the Skagit river above Concrete, Wash. The box cars are spotted on track scales and weighed as loaded.

C. L. Wagner is vice president in charge of operations; H. A. Ambler, superintendent, and E. M. Buchanan is chief chemist.

#### **Olympic Portland Cement Co.**

The Bellingham, Wash., plant of Olympic Portland Cement Co. was built in 1913 and has the distinction of being one of the first if not the first in America using the wet process. The plant was designed by F. L. Smidth and Co. It had originally two 170x9x10-ft. Vulcan kilns with 5x8x35-ft. double-shell rotary F. L. Smidth pressure coolers. In 1925 a third kiln was added. Clinker brick are used for lining the fire zones and fire brick for the remainder of the kiln.

Limestone is secured from the company's quarry near Sumas, Wash., which is about 35 miles north of the plant, near the Canadian border. After being crushed at the plant the stone is transported in company-owned, standard-gage, hopper-bottomed cars over the rails of the Chicago, Milwaukee and St. Paul and Pacific R. R. to the cement plant. The quarry and crushing plant were described in *Rock Products*, November 23, 1929. Clay is secured at the company's pits located between Bellingham and Ferndale



**New silos and packhouse at the Bellingham, Wash., plant, Olympic Portland Cement Co.**



**Jack Krabbe, one of the crack drillers at the Sumas, Wash., quarry of the Olympic company**

and is hauled to the plant by the Great Northern R. R.

The wet clay is stored in an enclosed storage shed by a Toledo crane using a 2-yd. Browning clamshell, which discharges to a hopper ahead of the wash mill. The wash mill discharges to a double-agitator clay tank, from which the discharge is pumped to the feed end of the three No. 85 Kominuters, which are each driven by 125-hp. motors. The Kominuters discharge to elevators delivering to three Trix separators, the oversize running to the Kominuters with fines passing to a No. 20 and two No. 18 Smidth tube mills. Limestone is fed also to the Kominuters by F. L. Smidth cradle feeders. The No. 20 tube mill is driven by a 450-hp. General Electric super-synchronous motor and the smaller tube mills by 200-hp. induction motors.

The slurry from the tube mills is stored in three tanks equipped with mechanical agitators, and these tanks discharge to one triple-agitator tank for complete blending and mixing. The contents of this tank are discharged by air lifts to storage tanks resting under the feed ends of the kilns. From the storage tank the slurry is pumped by 9 in. F. L. Smidth double plunger pumps to the ferris wheel type kiln feeders.

Pulverized coal is used for fuel, although arrangements have been provided for burning oil; and switching from one fuel to the other can be done in a short time without cooling down the kiln seriously. The coal is pulverized after drying in a Cummery dryer by a Kominuter in series with a tube mill, using a No. 66 Kominuter and a No. 18 tube mill. A Brown recording pyrometer is used as a check, for the convenience of the burner, with hot points both at the feed and discharge ends of the kiln. The hot point is inserted near the foot of the stack and at the entrance to the clinker cooler. Allison draft gages are mounted near the feed end of the kiln in such a position that the burner can, by means of a 2-in. telescope, read the dials from the burner platform. Red lights flash every revolution of the ferris-wheel feeder. These lights are also so located that the kiln operator can conveniently note that they are operating properly.

#### **Reclaiming the Clinker**

The cooler discharges to a screw conveyor that delivers to a Link-Belt conveyor elevator and discharges to a cross belt conveyor over the top of the enclosed ground-storage clinker pile. The clinker is reclaimed by belt conveyors passing through a tunnel under the stock pile, which discharges to a bucket elevator serving the finish mills. There originally were two No. 85 Kominuters in series with two No. 18 tube mills, and in 1925 a No. 20-39 Unidan mill was installed. The Unidan mill grinds the clinker to the fineness required in one pass and is said to have as much capacity as the two Kominuters and tube mills combined. The Unidan mill is driven through an F. L. Smidth and Co. "Symetro" drive by a 500-hp. Titan, synchronous motor. Gypsum is weighed to the steel hoppers serving the finish mills.

The finished cement is elevated by an inclined belt conveyor and distributed to ten storage silos, each holding 10,000 bbl., with reclaiming by means of "Exbiners" and screw conveyors that discharge to elevators serving two steel parabolic bins mounted over four 4-tube Bates packers. The packers are so arranged that two discharge to the same belt conveyor, one delivering to tracks on one side of the packhouse and the other to tracks paralleling the other side.

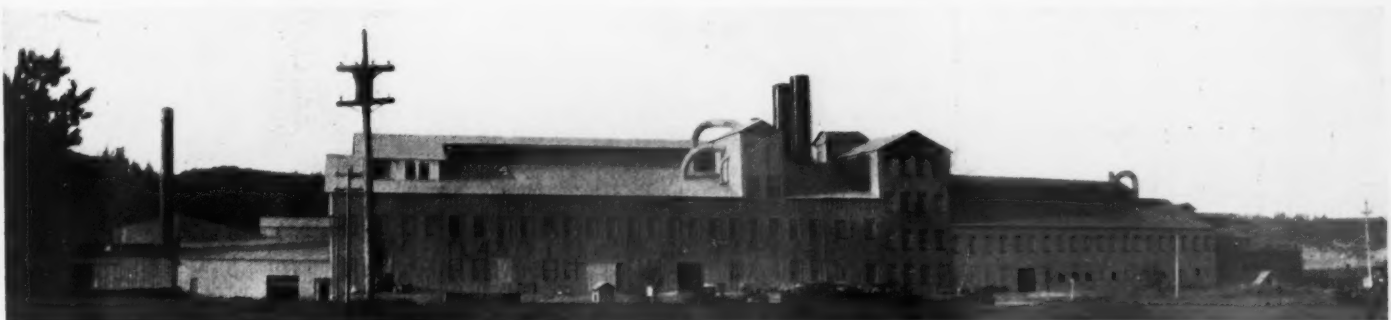


**Paul Kaylor (left), chief electrician, and Charles Shepard, mill foreman, Olympic company**

A new pack house has just been completed consisting of eight reinforced concrete silos, 65 ft. high and 20 ft. in diameter with three star interstices and seven outside interstitial bins, giving an estimated additional capacity for storage of 50,000 bbl. The new pack house and silos were designed by F. L. Smidth and Co. and constructed by the Cassidy Engineering and Construction Co., Seattle, and the machinery was installed by the cement company.

There are provided two 3-tube Bates packers that discharge to a shuttle conveyor driven by a 5-hp. General Electric motor through a DeLaval right-angle gear reduction unit, so connected that the belt's direction of travel can be reversed, and cars loaded from both sides of the building. Sly dust collectors are installed for taking care of the lighter spill from the packers in conjunction with the "Fluxo" system of handling the heavier spill.

The silos will be filled by a Link-Belt conveyor that discharges to a 16-in. screw conveyor mounted over the tops of the bins, which discharges to the various bins. The belt conveyor is driven by a 10-hp. General Electric induction motor through a Pacific Gear and Tool Works reduction



**International Portland Cement Co., Ltd., plant at Spokane, Wash.**

unit, and the screw conveyor by a 20-hp. motor and gear reduction of the same type in conjunction with chain drives.

#### **Bin Emptying System**

The bins will be emptied by the "Fluxo" system of pumping cement, introduced into this country by F. L. Smidth and Co., and this is the first installation of its kind in the United States. The Fluxo pump is operated by vacuum and air pressure and is claimed to have practically no wearing parts.

The "Fluxo" system will deliver to the packers or can be used to withdraw the cement from one silo and return to any other; so it can be used for blending if necessary, or for combining parts of several silos for any reason.

A. F. Krabbe is manager in charge of the company's operations. Frank Ronk is chief chemist and Charles Shepard mill foreman and Paul P. Kaylor, chief electrician.

The Olympic Portland Cement Co. is a British corporation with home office in London. Balfour Guthrie and Co., Seattle, Wash., have the management and sales.

Late in 1927 the company started production of Velo quick-hardening cement under license from F. L. Smidth and Co., using the same equipment as for the production of ordinary portland cement.

The company ships over the rails of the Northern Pacific, Great Northern and the Chicago, Milwaukee, St. Paul and Pacific.

#### **International Portland Cement Co., Ltd.**

The plant of the International Portland Cement Co., Ltd., is located about nine miles east of Spokane, Wash., and secures its rock from Powell Spur, a small settlement seven miles above Marcus, Wash., on the Columbia River. The company recently completed and placed in operation a new crushing plant at the quarry, which also supplies a considerable tonnage of high calcium limestone for paper mills and for metallurgical fluxing stone. Besides these products the quarry crushing plant ships chicken grits and agricultural limestone. The limestone contains a very low percentage of magnesia (0.17%), which makes it very suitable for chicken grits as it is said that high magnesium limestones or limestones with magnesia in appreciable amounts tends to have too much of a laxative action on poultry. Seven sizes of grits are produced ranging from baby chick sizes on up to larger sizes. This material as well as the agricultural limestone is shipped in paper bags using Bates packers for sacking.

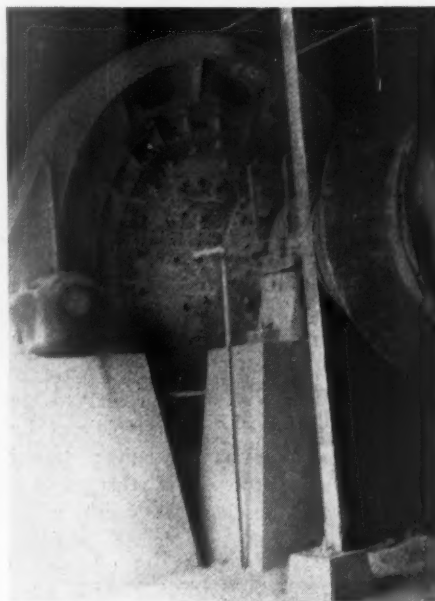
#### **Good Markets for Grits**

At present the grits are produced by grinding the cement-mill rock in a No. 40 Tel-smith gyratory crusher, followed by a Fuller-Lehigh mill delivering a product 25% of which is suitable for grits and the balance for agricultural purposes; but it is the intention of the management to replace this

with a small Symons cone crusher, as experiments have shown that by such a course the ratios of fines to coarse will be about reversed. This is more desirable as the market has been greater for the grits than for the finer limestone. "Hum-mer" screens are used for sizing these materials.

#### **Sizing the Stone**

The rock from the quarry is dumped to 30-in. live-roll grizzlies, set so that the fines range in size from 10 in. to 14 in., with the oversize dropping to a 25-in. by



**The 10-ft. by 66-in. conical mill for raw grinding at International plant**

32-in. Champion jaw crusher. This primary crusher discharges to a second set of live-roll grizzlies, with 6-in. openings. The stone through the first grizzly and on the second (6-in. to 14-in.) is shipped for "paper rock" from a separate bin. The fines from the second roll grizzly are conveyed by belt conveyors to a No. 6 McCully gyratory that discharges to a cross conveyor. This conveyor delivers to a bar grizzly, the oversize from which falls to a bin for smelter or metallurgical rock, and the fines to a separate bin for cement-mill rock. A third bin is used for low limed materials.

It used to be the practice at the mill to make cement from three different materials, two limestones taken from two different quarries and a clay, but at present only the Powell spur quarry is used as a source of stone. The overburden, a soft clay, which could almost be classed as a bentonite, is used as a source of silica and alumina.

These products are delivered to the plant and dumped to ground storage from an overhead trestle. A belt conveyor in tunnel is used for reclaiming and also to make the preliminary blend. High and low calcium limestones and the clay are kept separate in this pile, and the preliminary blend is an approximation obtained by simply drawing

to the belt the approximate amounts. The mix is then dried in a rotary dryer, after which the mix is crushed in a 48-in. Symons cone crusher set to deliver a 3/4-in. product. The product from the cone crusher passes over a "Hum-mer" screen with 3/4-in. mesh cloth, the oversize falling to a set of 12-in. by 30-in. Union Iron Works rolls.

The crushed mix is stored in ten concrete bins, each having a draw capacity of 100 tons and, after analyses, the products from any four of these bins can be proportioned by four Schaffer Poidometers mounted on industrial tracks under the bins. By this method then the Poidometers can be moved from bin to bin as desired. The weighing devices are all wired so that in event one stops or a bin runs empty they all stop.

The four Poidometers deliver to a belt conveyor serving a bucket elevator that delivers to a concrete bin ahead of the 10-ft. by 66-in. Hardinge mill, the Hardinge mill having replaced the grinding equipment previously used.

#### **Raw Grinding with a Conical Ball Mill**

The Hardinge mill is delivering 25 tons per hour of 86% minus 200-mesh material and requires 525 hp. to operate, including the fan, with a ball load of 30 tons of steel balls. The original ball load consisted of 10 tons of 7/8-in., 10 tons of 1 1/2-in. and 5 tons each of 2-in. and 2 1/2-in. sizes.

The product from the Hardinge mill is delivered to six concrete bins arranged in two rows of three bins each, which are connected up similarly to the 10 bins ahead of the grinding mill with two Poidometers, so that a third and final blend can be obtained before sending to the kilns.

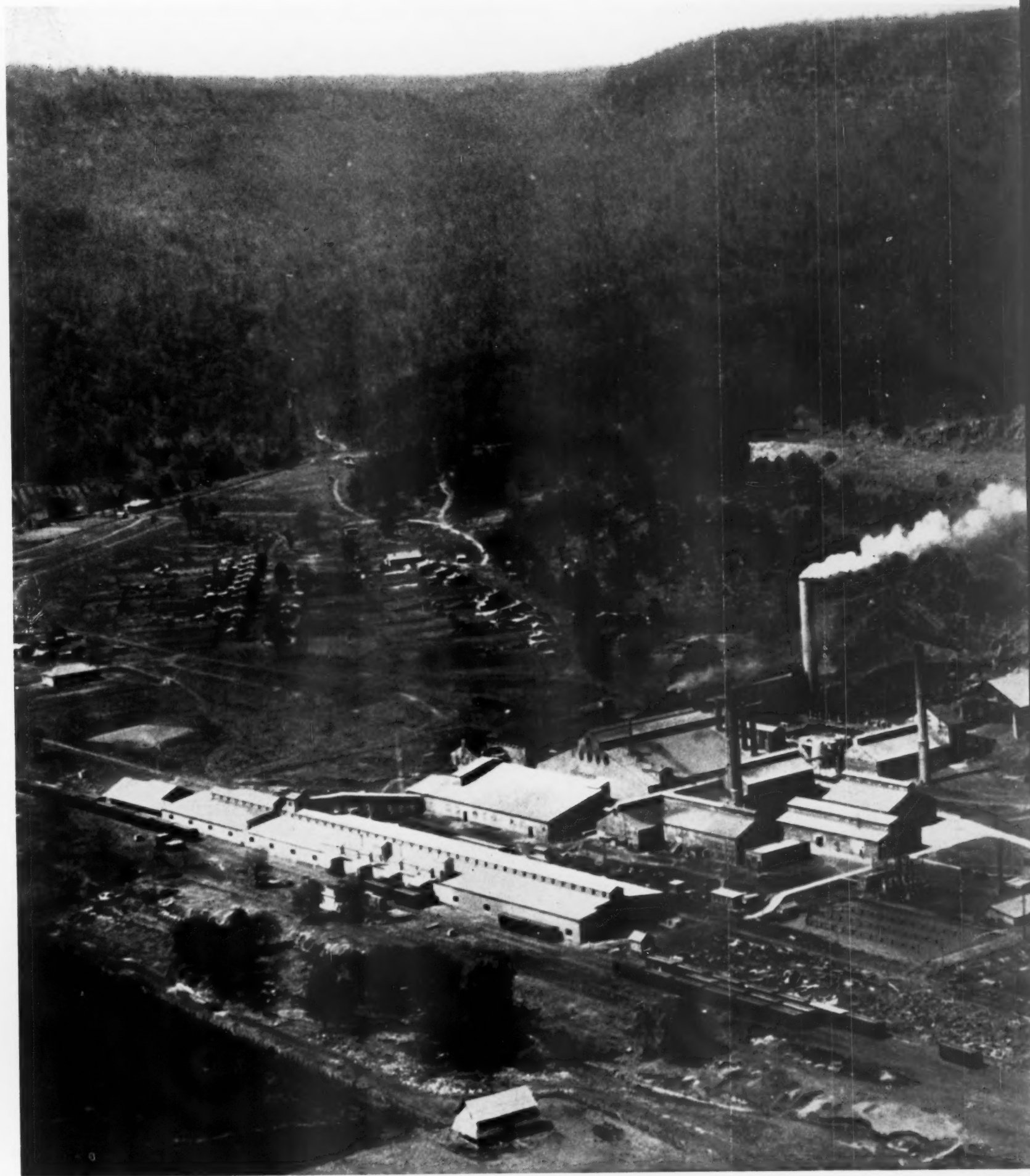
There are two 8-ft. by 160-ft. Vulcan kilns, coal-fired, capable of producing 850 bbl. of cement per day each. The clinker from the rotary coolers discharges to ground storage, reclamation being by a belt conveyor in a tunnel below. The finish grinding is done by three Fuller-Lehigh mills and a two-compartment Compeb mill, having a total grinding capacity of 1400 bbl. per day.

H. T. Brewer is superintendent.



**H. T. Brewer, superintendent, International company, in the doorway**

## Supplement to Rock Products, Volume



*Pennsylvania-Dixie Cement Corp. plant No. 3 at Richard City, Tenn., n*



*Corp. plant No. 3 at Richard City, Tenn., near Chattanooga; annual capacity 2,400,000 bbl.*

1 12, 1930





# Review of Stanton Walker's Paper on "Effect of Characteristics of Coarse Aggregate on the Quality of Concrete"

By Edmund Shaw

Contributing Editor, Rock Products

**A** THOUGHTFUL and rather conservative summing up of what is really known of the effect of the characteristics of coarse aggregate on the quality of concrete best describes Stanton Walker's paper read before the recent convention of the National Sand and Gravel Association at Memphis, Tenn. Mr. Walker is director of the engineering and research division of the Association, but his paper shows that he has not allowed his position to bias his judgment as a research man. The purpose of the paper seems to be to look for fundamental causes and to put aside opinions that have not a real preponderance of evidence in their favor. In every case the conclusions drawn are based on the research of undisputed authorities.

## Characteristics Listed

The characteristics which are listed by the paper are:

1. Soundness and durability.
2. Hardness and strength of aggregate particles.
3. Surface texture.
4. Shape of particle.
5. Inclusion of deleterious substances.
6. Size and gradation.

Mr. Walker believes that mineralogical composition, absorption, specific gravity and some other characteristics which have been supposed to affect the quality of concrete have only an indirect effect, those listed being all that have a direct bearing. Although something might be said on the other side, the reviewer does not quarrel with this conclusion particularly. But I do feel that it should be pointed out that Characteristics No. 1 to No. 4 are inherent properties coming from the material of which the aggregate is made, while No. 5 and 6 (cleanliness and gradation) are characteristics which may be conferred on aggregates by manufacturing processes. Hence all these characteristics are not of equal importance to the producer. If, for example, he is crushing limestone he cannot alter the soundness, hardness, surface texture and shape of particle in his product, but he can alter the size of particle and the gradation and can throw out deleterious materials. In the case of those properties that he cannot alter he can show that their effects may be modified and controlled by the design or proportion-

ing of the mixture into which they enter. It is this which justifies so much research in aggregates and calls for much more of it. And it justifies the conclusion given in the first part of the paper that "proportioning, curing, mixing placing, etc., are of as great, and in most cases of greater importance than the type of aggregate used."

## Soundness and Durability

In discussing soundness and durability, the paper reviews the work of A. T. Goldbeck, director of the bureau of engineering of the National Crushed Stone Association, which should be familiar to ROCK PRODUCTS readers as it was abstracted in the October 16, 1929, issue. This work showed the fallibility of the sodium sulphate test and described an accelerated freezing and thawing test which could be applied in about the same time. The paper also reviews the work of Prof. Scheler, reported in the 1928 *Proceedings* of the American Society for Testing Materials, which it says is the most comprehensive investigation published to date. Scheler found that almost any concrete could be disintegrated by freezing and thawing and that the severity of the test depended on the rate of change of temperature. The part played by the aggregate varied. With low water-cement ratios failure was usually due to failure of the coarse aggregate, while with high water-cement ratios the mortar disintegrated first. Scheler does not believe that the mortar offers as much protection to the coarse aggregate as is commonly believed and he states that it is only slightly effective in this respect.

This seems to be enough to show that, as the paper says: "Accelerated tests yield valuable information but sufficient experience has not been had with them to permit of translating their results into terms of service for different conditions." In the reviewer's mind a more comprehensive study of disintegrated concrete than has yet been made is indicated, and the study should include accelerated tests for soundness of the aggregates employed where this is possible. Fortunately one of the sub-committee of Committee C-9 of the American Society for Testing Materials is now collecting information from which such a study may be carried on.

As the paper points out, unsound aggre-

gates are not the rule but the exception. As regards gravels, the way in which they were made by natural forces usually guarantees their soundness and durability. But, the paper adds, there are those gravels "which contain unsound particles in sufficient quantity to make important definite information as to their effect."

## Hardness and Strength

"Coarse aggregate particles (to quote from the paper) should be hard and strong enough to transmit the stresses that are imparted to them by the mortar. . . . There is no difficulty in identifying definitely strong or definitely weak and friable aggregates. The problem lies in the identification of border-line cases and in the determination of the effect of different amounts of weak particles."

It is further pointed out that the difficulty of setting specification limits for hardness is increased by its effect on the kind of service to which the concrete is to be put. A wide range of hardness gives concretes of equal value in compressive strength, a narrower range equal values in flexural or tensile strength and a still narrower range equality in resisting abrasion. "Other stresses," Walker says, "such as impact, shear, etc., have been studied so little that sufficient information is not available to permit of even a brief statement."

The various methods of testing for hardness are discussed. Walker, as author of one of the most important papers on the Deval abrasion test, can speak with full authority on this subject. The methods mentioned, in addition to the Deval test and its modifications, are: the standard test for toughness, the Dorry test for hardness, Jackson's impact test, Abrams' method of crushing in a testing machine, and the pressure tests on individual particles in the Douglas machine.

"Engineers have generally specified limits obtained from the Deval test, or some modification of it," and this, Walker says, "has resulted in the exclusion of many suitable materials." At the same time, no dependable data have been secured that will correlate the concrete-making properties of the aggregate with the hardness as shown by this test. The other tests fail also in this regard although some have the value of showing

the percentage of rotten stone in a sample.

To judge from this paper, there is nowhere any definite evidence that the concrete-making properties of a coarse aggregate are *closely* connected to its hardness. In support of this Geiseke's tests are reviewed. They show that practically uniform compressive strength was obtained with stones having crushing strengths varying from 4400 to 35,000 lb. In fact somewhat higher strengths were secured with the softer stones, which, the paper says, may have been due to the lowering of the water-cement ratio by their greater absorption. Hardness and toughness were found in these tests to follow the loss by abrasion almost proportionately.

The paper is careful to point out that it is not safe to conclude from this that the strength of the aggregate particle for any range of quality is of no importance to the compressive strength of concrete. Very weak and friable aggregates give appreciably lower strengths. Abrams found differences ranging from 2000 lb. to 4500 lb. due to strengths of aggregate, his studies including such materials as tufa and cinders. But the great amount of data for gravel and crushed stone indicates that there is no relation between hardness of aggregates and compressive strength of concrete throughout a wide range.

#### **Flexural Strength of Concrete**

The well-known flexural strength tests of Lang on gravels and different rocks, the Bureau of Public Roads tests of the effect of type of aggregate and Goldbeck's comparative tests of gravel and crushed stone are briefly reviewed. Goldbeck concluded that the Deval abrasion test furnished a good measure of the characteristics of gravel which may produce concrete of low cross-bending resistance. But Kellerman's report, made on a greater number of samples and including many types of aggregates, concludes that there is no such relation of the hardness of aggregates to the flexural strength of concrete, within the range of the samples tested, and Walker finds the preponderant evidence favors this view.

However, as the paper says, "The difficulties of obtaining authoritative information on this question will be realized. Where can one obtain two gravels or two crushed stones with particles of different strength but with all the other characteristics the same? Synthetic aggregates have been suggested but, while it is feasible to produce them, difficulties will be encountered in controlling their properties accurately. Work has been done with gravel sorted into its various rock types and recombined. This method offers promise of furnishing valuable information."

#### **Surface Texture**

No characteristic of aggregate has been more discussed of late than surface texture,

and since the subject is so controversial the section of the paper which discusses it will be quoted in full and without comment:

"Surface texture is a characteristic to which little attention has been given in specifications and for which no measure has been developed. Many engineers feel that it is important on account of its effects on the bond between the aggregates and the mortar. Definite information on the effect of surface texture is as difficult to obtain as of strength of particles, and for very much the same reasons; aggregates of different surface characteristics do not generally have common properties in other respects. Certain tests indicate that surface texture, or some property closely allied to it, has an important bearing on the tensile and transverse strength of the concrete. So far as compressive strength is concerned, the evidence indicates that surface texture has little or no effect.

#### **Differences in Strength**

"In the tests by Kellerman different aggregates gave rather large differences in transverse strength, which, in many cases, could be accounted for most plausibly by differences in surface texture. When these results are corrected for differences in cement content they show two high grade limestones to produce flexural strengths about 15% higher than a trap or a granite. The physical properties of these materials indicate that the strengths of the particles were well above a value which would be expected to affect the strength of the concrete. The absorptions reported indicated that the effect of this factor on the water-cement ratio did not contribute to the differences in strength. Differences in bond between the mortar and the stone would account for them. The suggestion has been made that chemical action between the cement and the limestone may account for higher strengths with this material. There is, however, little definite evidence to support this view. In the same group of tests, a glacial gravel consisting of strong and rather rough textured particles gave flexural strengths about 15% higher than a water worn gravel with smooth and, apparently, equally strong particles. In neither of these samples was there any important differences in compressive strength.

"It should be emphasized at this point that surface texture should not be confused with angularity. There is no valid evidence with which the writer is familiar that a gravel, for example, with a high proportion of crushed particles will produce higher strengths either in compression or flexure than a similar one with a lower percentage or with no crushed particles, when comparisons are made in a proper manner."

The effect of the shape of particles on aggregate on the concrete made from them is also the subject of much controversy at the present time. Regarding this Walker says in part:

"It has been variously claimed that this factor does not affect the strength and that it has an important effect on the strength, but it is felt that neither of these conclusions is based on proper account of differences in cement content and workability.

"From studies limited to compressive strength, it has been the generally accepted conclusion that the shape of the particle (and also other characteristics within wide limits) has little effect on the strength when comparisons are made for the same proportions. This conclusion leaves out of account the fact that the differences in the shape of particle affect the voids of the aggregate, and, consequently, the amount of cement per unit volume of concrete and the amount of mortar in relation to the voids; the aggregates with the lower void content contain less cement and a larger amount of mortar in proportion to the voids.

"With increased attention to transverse and tensile strength belief developed among engineers that particles angular in shape produced higher flexural strengths than those of rounded shape. This conclusion seems to be based on comparisons which do not take into account the effect of other aggregate characteristics, differences in cement contents and workabilities."

#### **Mr. Walker's Conclusions**

The paragraphs which follow this give Mr. Walker's conclusions, drawn from an analysis of Kellerman's report of the Bureau of Public Roads tests, which were published in *Rock Products*, December 21, 1929. It will be remembered that he made comparisons on a basis of equal cement contents and an equal ratio of mortar to voids, and that this gave a quite different grouping of the aggregates than that given in the Kellerman report. After quoting this Walker says:

"In comparing aggregates of different void contents in concrete, it seems entirely reasonable to require that the cement content be maintained constant and that the quantity of mortar used in each case will produce comparable workabilities. Preliminary experiments have indicated that this will be accomplished if approximately the same ratio of volume of mortar to volume of voids in the coarse aggregate is maintained. Studies of Kellerman's data on this basis lead to the conclusions which have been quoted above. Tests now under way in our laboratory will bring additional light."

#### **Deleterious Materials**

Under the heading, "Miscellaneous deleterious substances," Walker considers the effect of soft and friable particles, shale, dust and clay, and mentions the effect of alkalies and organic matter and mica, coal and lignite.

It concludes from the evidence at hand that soft and friable particles, in the amounts which anyone would ever permit them to be in concrete aggregates, are less objectionable than they are usually supposed to be. In

road slabs they may work to the top while the slab is being finished and eventually make pits. They are unsightly but Walker says he has made careful inspection of many such road slabs and he cannot find any evidence that ravelling or progressive disintegration starts from these pits.

The available test data show that, according to Walker, soft and friable particles do not affect strength particularly in the amounts in which they are permitted in ordinary aggregates. There is no comprehensive study of this but one state highway department is carrying one on at the present time, sorting gravel into rock types and recombining with definite percentages of soft and friable particles.

#### Flats and Shale

"Flats" have been classed as with soft and friable particles, but the researches of Walker and Proudley, published in 1928, have definitely established that they do not affect the strength, workability or finishing quality of concrete in amounts up to 14% of the coarse aggregate. Provided they are structurally sound, flats seem to be satisfactory as aggregates in spite of the prejudice against them.

As with soft particles, the effect of shale on strength and workability seems to have been exaggerated, according to Walker, who has analyzed Lang's researches and concludes from them that there is only about a 5% reduction in strength for a 10% content of shale, a percentage that no one would think of allowing in concrete aggregate. His conclusion is that, "if the shale shows evidence of its presence in surface pits only, little harm will be done; however, shale in excess quantities may cause disruption of the concrete when exposed to severe conditions."

I was especially interested in what the paper has to say about the effects of clay and dust because of other investigations that have been made in the past year or two, especially the tests of Pearson on sands for mortar. The paragraph in Walker's paper relating to dust and clay reads:

#### Dust, Clay and Alkalies

"Dust and clay are objectionable principally on account of their effect in forming planes of weakness or soft and friable surfaces. Laboratory tests of aggregates containing considerable amounts of dust and clay fail to indicate any important relations in strength, but observations of structures, particularly those subjected to the action of the weather, show excessive amounts of dust and clay to be one of the most common causes of disintegration of concrete. They are particularly objectionable in concrete containing large quantities of mixing water or in concrete subjected to vigorous finishing methods. Clay lumps, unless broken up in the mixture and distributed through the mass, will cause pits in the concrete and sometimes pockets in the interior which will

permit of frost action. Coatings which adhere to the aggregate particles during the mixing of the concrete are harmful because of their effect on the bond between the mortar and the aggregate. Thin films of wet clay or dust are often classified as coatings; unless they adhere to the aggregate surfaces their effect will be the same as a similar amount of loose dust and clay."

Alkalies, in the amount found on aggregates, are said to be objectionable mainly because they cause efflorescence. Organic matter is highly objectionable but it may always be removed by thorough washing. Mica, coal and some other materials need further research to identify their effects.

#### Grading of Coarse Aggregates

"It is lack of knowledge of what constitutes workability in concrete that most complicates the determination of the effect of grading," says Walker. "Comparisons between two materials for which the ratio of fine to coarse aggregate is maintained the same will show entirely different results than if the ratio of fines to coarse is varied in an endeavor to make the concrete have the same appearance so far as that intangible property commonly referred to as workability is concerned."

"Probably the most definite conclusion that can be drawn from a study of the data which are available is to say that, in general, coarser gradings produce higher strengths but that the effect of grading of coarse aggregates is very much less than it is commonly believed to be. Tests carried out in the research laboratory of the National Sand and Gravel Association on gravels graded to cover the extreme range of common specification limits have shown comparatively minor differences in strength—less than 10%. Our laboratory has also made tests of gravel of a wide range in size, but similarly graded, and the differences in strength obtained by varying the maximum size from  $\frac{3}{4}$ -in. to  $\frac{3}{4}$ -in. or from  $\frac{3}{4}$ -in. to 2 in. was only about 10%." (These tests were reviewed by Walker in the January 4 issue of *Rock Products*.)

In the study by Kellerman, referred to previously, the conclusion was arrived at "that within the limits of the study, variations in grading of the coarse aggregate have no consistent effect upon the strength of the concrete."

Walker follows the Kellerman report in warning the reader that this does not diminish the importance of gradation in affecting the yield, the workability and the uniformity of concrete.

In one of the concluding paragraphs, Walker says:

"The foregoing discussion should serve to demonstrate the wide field for research offered by coarse aggregates. While it has seemed impracticable to avoid emphasis on lack of information, it should be clear from this discussion that, except for borderline cases sufficient information is available to

permit of the intelligent use of coarse aggregates. However, with the increasing depletion of sources known to be satisfactory, definite information from which to judge doubtful cases becomes increasingly important."

Among the statements in the summary, perhaps the most important is this: "Except for durability and certain deleterious substances, there are, in general, no significant aggregate characteristics the effect of which cannot be compensated for by relatively minor changes in the proportions. The selection of aggregates is, therefore, almost entirely a problem of economics."

#### "Cardox"—An Explosive Using CO<sub>2</sub>

THE BUREAU OF MINES in its serial No. 2920, released in March, 1929, describes a new permissible blasting device which utilizes liquid carbon dioxide which is discharged from a steel container or shell, the shell being placed in a bore hole, stemmed and tamped in a manner similar to that employed with other explosives, and fired by electricity.

The shell or container for "Cardox" is roughly 39 in. long and 4 in. in diameter. The shell is made of heat-treated, chrome-molybdenum steel with walls  $\frac{1}{2}$  in. thick, and has at one end a replaceable disc which shears or gives way when the contained liquid CO<sub>2</sub> gas has been heated. The other end of the shell contains the mechanism for filling with liquid CO<sub>2</sub> from any convenient source and a detachable firing plug which is inserted after the shell has been placed in the bore hole.

Heat for conversion of the liquid CO<sub>2</sub> is supplied through a heater element consisting of powdered aluminum, ground charcoal and sodium chlorate. Within this element is an electric squib which is fired by electricity.

The liquid carbon dioxide used for filling the shell is a commercial product that is procurable in cylinders which have a capacity of 50 lb. of liquid. Usually the supply of carbon dioxide is drawn from several cylinders simultaneously at the charging plant. The charging plant embraces a system of refrigeration and a small two-stage compressor through which the carbon dioxide from the cylinders is passed to the inside of the shell while the filling valve is open. The carbon dioxide is charged into the shell at a pressure of 2,000 lb. or more per square inch.

In action, the liquid CO<sub>2</sub> expands, due to the heat, causing the replaceable disc or shear plate to give way, and the resulting rush of CO<sub>2</sub> gas from the CO<sub>2</sub> supplies the energy to break down the stone or coal. The violence of the explosive is similar to that of ordinary dynamite.

The explosive is safe to handle when the safety precautions outlined in the bulletins of the bureau are complied with.

## How the Use of Agricultural Lime in Ohio Is Increased

By Vernon E. Bundy

Agricultural Extension Service, Ohio State University, Columbus, Ohio

FARMERS in Ohio bought more limestone for sweetening their soils in 1929 than in any previous year during which records have been kept. Total purchases in the 88 counties of the state during 1929 amounted to 237,381 tons of liming material, it is announced by R. M. Salter, head of the soils departments of the Ohio State University at Columbus and the Ohio Agricultural Experiment Station at Wooster. The previous high record for one year was 236,015 tons in 1925. In 1928 the tonnage was 210,683.

Reports which have been tabulated by Prof. Salter divide the 1929 lime tonnage into: Agricultural limestone, including marl and carbonated forms, 198,504 tons; hydrated and burned lime, 26,683 tons; other liming materials, including agricultural slag, 12,194 tons.

In analyzing the increase over the sales in 1928, Prof. Salter says: "The increase was gratifying, amounting to 26,698 tons or 12.7%. The increase in agricultural limestone was 10.3% and in hydrated and burned limes 47%. Fifty-one out of the 88 counties in the state showed increases over their 1928 tonnages. One notable increase was in Williams county, which increased from 203 tons in 1928 to 2857 tons, more than ten times as much, in 1929."

### Farmers Turn to Dairying

Back of the increased use of lime on Ohio farms is a change which is taking place in the nature of the agricultural products market—a swing to dairy products. Ohio has many large cities and these cities offer a market for fluid milk. Hardly any farmer in the state, which is covered with a network of hard roads, is outside of the radius of a market, which in ordinary times is a profitable market, for fluid milk. In order to produce milk profitably the farmer must have a legume hay to feed his dairy cows. In order to produce clover, alfalfa, and most of the other legumes, his soil must be neutral or alkaline, not acid. So the farmer turns to dairying in order to take advantage of a new market opportunity; he discovers his need of legume hay; he buys lime and spreads it on his soil in order to be able to grow the legumes. With the exception of a very small area in the state, Ohio soils demand lime if they are to grow legumes. In many cases the application of lime has been found more profitable than the application of plant food in the form of commercial fertilizers, up to a certain point.

Educational efforts of the specialists in crops and soils for the Agricultural Extension Service of the Ohio State University and the Ohio Agricultural Experiment Sta-

tion have been instrumental in increasing the sale of limestone materials to farmers in every quarter of the state. For five years the extension service has sent into the state a portable chemical laboratory, which has tested thousands of soil samples in every county in the state. The experts who have accompanied the laboratory have made recommendations for the application of lime and fertilizer, immediately after the completion of the tests.

In the northeastern portion of the state, Earl Jones, one of the extension specialists, and the county agricultural agents have held several schools and conferences with the sales forces of companies manufacturing agricultural liming materials and have asked these salesmen to increase their efforts to distribute more liming materials among the farmers, at the same time supplying them with accurate data on the soil needs in this respect.

### Speeding Deliveries

Limestone companies and trucking companies, as well as other agencies, are extending the service of delivering the lime to farmer buyers more generally than formerly. Because these companies are usually equipped with trucks, they handle the transportation problem more easily than the farmer himself. Trucking companies are making a specialty, in many of the smaller towns of the state, in delivering the limestone. Several farmer-owned co-operative elevators in the state have recently adopted the policy of delivering lime purchased through them.

This spring Homer B. Crall of Crawford county sat in his farm home listening to a lecture on soil chemistry. The lecture was being broadcast by radio from WEOA, the Ohio State University radio station at Columbus. The speaker was Dr. Richard Bradford of the soils department of the university. As he listened, Crall made up his mind to use a large proportion of his year's fertilizer appropriation for the purchase of lime for his soil. The lecture ended at 10 o'clock and just as it ended a salesman for a limestone company drove into the yard. He got the order which Crall had been deciding on. Exactly 24 hours later, 44 tons of coarse limestone meal had been delivered and spread, at the rate of four tons to the acre, on a field on which Crall plans to grow corn this year.

A lime-spreading device designed by Wilmer Lutz of Bucyrus, owner of a trucking service there, was used. The device was attached behind the 5-ton trucks which hauled the lime to the farm, and the trucks were driven directly into the field where the lime was to be spread.

## Automobile Registrations Gained 8% in 1929

MOTOR REGISTRATIONS last year exceeded 26,000,000 and gained 8% over the preceding year, according to information collected by the Bureau of Public Roads and made public March 30 by the Department of Agriculture.

Fees for registration and other purposes were nearly \$350,000,000, an increase of more than \$25,000,000 over such receipts in 1928, according to the statement, and approximately 93% of the total was used for highway purposes. The statement follows in full text:

Reports from State registration authorities to the Bureau of Public Roads, United States Department of Agriculture, show a total of 26,501,443 motor vehicles registered in 1929. The States and the District of Columbia collected in license fees, registration fees, permit fees, fines, etc., the sum of \$347,843,543.

### Gains by States

In percentage gain, the District of Columbia and New Mexico each show 19%. Nevada reports a gain of 16%, Arizona 15%, and Utah 14%. Four States, Georgia, Maryland, Massachusetts, and Tennessee, each show a gain of 12%, and three States, Michigan, Montana, and Texas, each report an increase of 11%. California, Idaho, Kentucky, New Jersey, and Washington each show a gain of 9%.

The registration totals and fees collected for all States are as follows:

	Registrations	Fees
Alabama .....	285,533	\$3,736,380
Arizona .....	109,013	748,565
Arkansas .....	233,128	4,212,161
California .....	1,974,341	10,489,068
Colorado .....	303,489	1,835,386
Connecticut .....	328,063	7,992,755
Delaware .....	54,960	1,023,440
District of Columbia .....	151,450	665,914
Florida .....	345,977	4,959,129
Georgia .....	358,905	4,568,209
Idaho .....	118,074	1,787,467
Illinois .....	1,615,088	17,087,209
Indiana .....	866,715	6,253,424
Iowa .....	784,450	11,919,350
Kansas .....	581,223	5,697,306
Kentucky .....	332,848	5,381,302
Louisiana .....	280,868	4,523,634
Maine .....	184,506	3,030,128
Maryland .....	319,873	3,295,314
Massachusetts .....	817,704	7,117,725
Michigan .....	1,395,102	23,212,316
Minnesota .....	730,399	10,846,826
Mississippi .....	250,011	2,963,381
Missouri .....	756,680	9,690,727
Montana .....	140,387	1,549,487
Nebraska .....	418,226	4,289,969
Nevada .....	31,915	296,881
New Hampshire .....	108,880	2,248,213
New Jersey .....	832,332	14,803,016
New Mexico .....	78,374	756,763
New York .....	2,263,259	38,293,313
North Carolina .....	483,602	7,045,116
North Dakota .....	188,046	1,989,475
Ohio .....	1,766,614	12,860,453
Oklahoma .....	570,791	6,964,360
Oregon .....	269,007	7,644,226
Pennsylvania .....	1,733,283	29,264,695
Rhode Island .....	134,009	2,403,809
South Carolina .....	231,274	2,674,379
South Dakota .....	204,199	3,150,657
Tennessee .....	362,431	4,288,420
Texas .....	1,348,107	20,418,696
Utah .....	112,661	838,300
Vermont .....	93,030	2,339,782
Virginia .....	387,205	6,145,296
Washington .....	442,341	7,547,382
West Virginia .....	268,888	4,565,836
Wisconsin .....	793,502	11,780,703
Wyoming .....	60,680	647,200

# Fundamental Facts for the Construction Industry

United States Census Will Gather Comprehensive Information on Construction

By Dr. Alanson D. Morehouse

Chief, Construction Section, Division of Distribution,  
U. S. Bureau of the Census

THE first census of the construction industry ever undertaken by the United States government is now under way as a part of the 1930 decennial census. It is being taken at the urgent request of the contracting group of that industry, as for many years leaders in the industry have realized the necessity of obtaining more complete and accurate statistics of their business in order to promote efficiency in the conduct of the construction industry. While in the past they have been largely forced to use estimates and general assumptions, it is now expected that essential facts will be available for this purpose as a result of the census. It will be particularly pertinent information at this time when President Hoover is emphasizing the importance of public works construction as well as private construction, as "the balance wheel of American industry," in securing and maintaining general prosperity throughout the nation. The figures obtained will also furnish the basis for further statistical research of even a more intensive nature.

Construction statistics have previously been gathered by various private agencies to serve certain particular purposes, but a comprehensive census such as that now contemplated is, of course, not feasible for such private agencies to undertake. Statistics on building permits, in cities where such permits are required, have been gathered for years, but they have fallen far short of giving a complete picture of the situation. Public buildings for federal, state, county and municipal governments and quasi-public or community buildings such as churches, colleges, institutions, etc., more often than not do not require permits; also a great amount of building construction has been done outside the corporate limits of cities, in which case no permits are required. Engineering construction such as railroad work, sewers, waterworks, and the like, are not covered by permits. Other private agencies for many years have been gathering statistics on the values of contracts awarded, but such statistics have not completely covered the United States nor have they covered much of the smaller construction work.

As a result of the present census, information will be available concerning the approximate number and kind of general con-

**Editor's Note**  
*WE ARE giving space here to a part of a statement broadcast by the Bureau of the Census to the construction industry because the results of course will be of much interest and value to producers of construction materials, provided these results are assembled and issued within a reasonable time. This is the first attempt of the government to assemble vital statistics of the construction industry and should have the active cooperation and assistance of every one whose business is dependent upon construction. Ultimately, if the results are available before they become obsolete, and the work is kept up periodically, these statistics should prove an invaluable guide to producers of construction materials in forecasting their business prospects — something all producers will agree is highly desirable.—Editor.*

tractors, subcontractors and operative builders throughout the United States and the total value of work performed by them in the various states and cities during the year 1929. It will also indicate the seasonal character of construction work of various kinds.

Although only contractors whose gross business during the year 1929 exceeded \$25,000 are required to fill out the report blanks, it is estimated that upwards of 150,000 contractors or contracting firms will be canvassed.

Replies to the inquiries are required by act of Congress. All information furnished by the individual contractor will be held in strict confidence. It will not be used as a basis for taxation but only for statistical purposes. Only employees of the Bureau of the Census, sworn to secrecy, will be permitted to examine the reports, and the information when analyzed and made available will not disclose, exactly or approximately, any of the figures in any individual report.

A committee representing contractors' associations and the Advisory Committee on Distribution, composed of nationally known business men appointed by the Secretary of Commerce, and various persons informed on construction matters, have materially assisted

the Bureau of the Census in the preparation of the report blanks and are otherwise helping in the prosecution of the work. The construction section handling this census of the construction industry is a part of the census of distribution of which Dr. Robert J. McFall, chief statistician for distribution, is in charge. The entire distribution census is a new expansion of the Bureau of the Census, which under Director William M. Steuart has kept constantly growing in response to the urgent demands of business and industry.

## Old Ohio Limestone Quarry May Become Zinc Mine

THE old Highland quarry, 10 miles north of Hillsboro, Ohio, which has been a source of much limestone for building and road construction, apparently is soon to assume a new role and a new place of importance in the economic life of Highland county. Recent tests of rock drilled from the quarry have revealed the presence of zinc and more than the usual accompanying traces of lead, promoters of the new project declare.

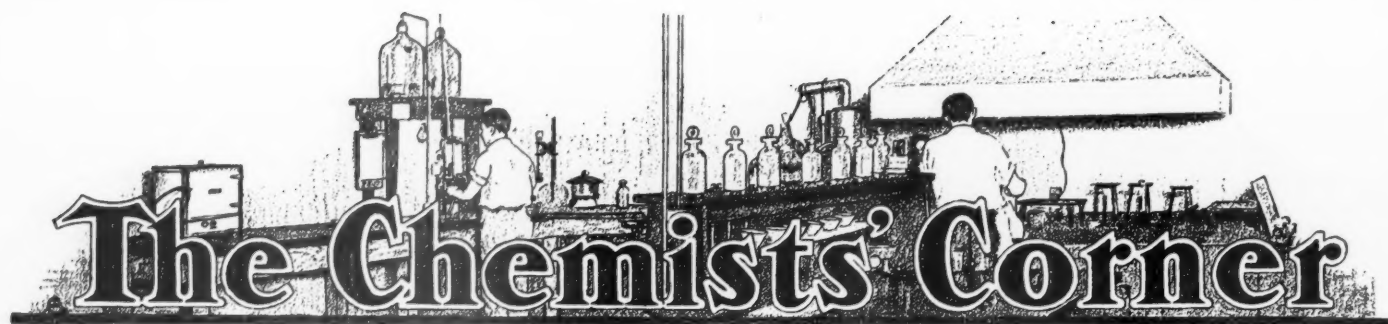
The specimens for the test were taken from a depth of approximately 50 ft. below the surface of the quarry.—*Loveland (Ohio) Herald.*

## Sand and Calcium Chloride Relieve Slippery Road Conditions

SAND and calcium chloride have been used successfully in relieving the slippery condition of icy roads during the winter by the Kent County (Mich.) Road Commission, according to O. S. Hess, engineer-manager.

The calcium is first spread on the icy surface by using a spreader hooked behind a truck in the usual manner. This operation is followed by an application of sand, distributed either by a sand spreader or from a regular dump truck operated at a rather high speed.

The minimum amount of sand found satisfactory is about 2½ cu. yd. to a mile.—*Engineering and Contracting.*



## Breaking Down of Tricalcium Silicate by Heat

By S. L. Meyers

Chief Chemist, Southwestern Portland Cement Co., El Paso, Tex.

IT IS generally known that cement absorbs moisture from the air, resulting in the high lime compounds setting lime hydrate free and forming hydrolized lower calcium silicates, while the aluminates are hydrated by direct addition.

The phenomena described here, and observed by the writer, are distinct from the above and should not be confused with it. Briefly, it is the breaking down of higher calcium silicates to lower calcium silicates and the setting free of uncombined lime under the influence of heat. The aluminates apparently remain unchanged.

In correctly recasting the mineral constitution of a cement from its chemical analysis, it is necessary to know the small amount of lime existing as calcium carbonate. Quick, easy and yet accurate methods not being available, it was thought that a simple way would be to run a free lime determination before and after ignition, subtracting the first from the second determination, which should correspond to the calcium oxide part in the calcium carbonate, which in turn should check the calculated amount of calcium carbonate from a carbon dioxide determination.

It was found that in all cases the increase of free lime on ignition was far greater than the dissociation of calcium carbonate present could account for. Further, after prolonged ignition the quantity of lime set free was almost equal to the theoretical quantity which would be set free if all of the tricalcium silicate present reversed to dicalcium silicate.

While cement breaks down more rapidly at higher temperatures, there does not appear to be any critical temperature for this breakdown, as the following results indicate:

30 MINUTES IN AN ELECTRIC MUFFLE AT DIFFERENT TEMPERATURES

	Free lime
Before ignition .....	0.76%
1200 deg. F. ....	0.84%
1300 deg. F. ....	0.97%
1400 deg. F. ....	1.26%
1500 deg. F. ....	1.52%
1600 deg. F. ....	1.59%
1700 deg. F. ....	1.80%
1800 deg. F. ....	1.94%
1900 deg. F. ....	1.98%
2000 deg. F. ....	2.10%

### Author's Note

*THIS is a short description of a property of cement which is, as far as I am aware, unknown. I know that portland cements change on storing when not perfectly protected from the atmosphere, and that clinker dusts due to a crystal-structure change of dicalcium silicate, and that a form of cement, mentioned by John G. A. Rhodin, dusts to an inert powder, but none of these are the same as the breaking down of tricalcium silicate in cements under the influence of heat.*

The effect of ignition over a period of several days, on both an ordinary portland cement and a high early strength portland cement, is shown below:

	—Ordinary portland cement—		—High-test cement—	
	Before ignition	After ignition	Before ignition	After ignition
Per cent free lime.....	0.82	12.10	0.65	13.00
Soundness (5 hr. in boil).....	o.k.	disintegrated	o.k.	disintegrated
1:3 sand tension, age 24 hr... (Lb. per sq. in.)	195	90	305	60
Age 3 days.....	300	175	380	180
Age 7 days.....	370	220	425	260

In the case of the ordinary portland cement, 11.28% of lime has been liberated, corresponding to the breaking down of 45.98% of tricalcium silicate; and in the case of the high early strength portland, 12.35% of lime has been liberated, corresponding to the breaking down of 50.35% tricalcium silicate to dicalcium silicate.

The presence of the liberated lime causing the expansive force, and the low strength of cements high in dicalcium silicate, and low in tricalcium silicate, no doubt accounts for the ignited cements' poor performance in the boiling test. Much shorter periods of ignition than the above and the liberation of only 2% or 3% of lime is sufficient to cause unsoundness in perfectly sound cements.

Although the major part of the loss of strength in the tension tests can be attributed to the reversion of the silicates, a very small part might be due to changing the

gypsum, or plaster of paris, present in the cement to anhydrite, the latter giving lower strength tests than either of the other two forms in cements.

The four chief mineral constituents of clinker were prepared from the pure oxides. Owing to the difficulties to overcome, neither the tricalcium silicate nor the tricalcium aluminate came to complete equilibrium during the clinkering process, as the presence of free lime in them before ignition indicates.

	% free lime*	% free lime†
4CaO : Al <sub>2</sub> O <sub>3</sub> : Fe <sub>2</sub> O <sub>3</sub> .....	0.00	0.00
3CaO : Al <sub>2</sub> O <sub>3</sub> .....	1.04	1.04
2CaO : SiO <sub>2</sub> .....	0.00	0.00
3CaO : SiO <sub>2</sub> .....	0.96	5.62

\*Before ignition. †After several hours' ignition.

(Here, the above minerals were powdered before testing.)

The above results indicate that tricalcium silicate is the only one of the four principal

constituents of clinker which breaks down and liberates lime. It is true that the tricalcium silicate in the above fairly pure state did not break down as rapidly as was expected, but it is probable that the high temperature of clinkering, made necessary by the absence of fluxes, accounts for this inertness.

Since cement materials have the property of reverting to less hydraulic forms under the influence of temperatures from a red heat to somewhere below their clinkering temperature, would the slow cooling of clinker as it passes from the clinkering zone of a kiln, out of the kilns and through the coolers, affect its constitution? To answer this question, samples of clinker were taken as they traveled this path, and their free limes run, but no variation occurred. To make the test more decisive, a large receptacle was well insulated and filled with hot clinkers as

they issued from the kiln. These clinkers remained above the red heat for several hours, but no increase of free lime was detected.

Later tests showed that unless clinkers were powdered, that is, made into a cement, reversion occurred. Gypsum does not play a part here, reversion occurring as readily in its absence as in its presence.

Aged cements show this property to a much greater degree than fresh cements. While a fresh cement may liberate as little as 1% free lime during a 30-minute ignition at 1750 deg. F., a cement kept in a well corked bottle for several years liberated 6.28% calcium oxide under the same conditions.

Neither aged clinkers nor fresh clinkers show reversion.

#### Summary

In powdered cements tricalcium silicate reverts to dicalcium silicate under the influence of heat, with a concomitant liberation of free lime.

None of the other major cement constituents exhibit this property.

Clinkers, or unground cement materials, do not revert under the influence of heat.

Aged cements are more susceptible to heat reversion than fresh cements.

### Effect of Acid Water from Coal on Concrete

**W**ATER which leaches through coal containing sulphur (in pyrite) always contains sulphuric acid, which will attack concrete. As there have been a few failures of concrete coal storage bins, the effect of this acid water on concrete was investigated by Edgar F. Wolf, for a Baltimore light and power company. A report is given in *Industrial and Engineering Chemistry* for October.

Water which had actually leached through coal was tried as a solvent. It contained 4.16% sulphuric acid. A piece of well seasoned 1:2:4 concrete was soaked in this for 291 days in all. Every week or so the concrete was removed and the sediment washed off and weighed, the concrete being placed in fresh acid water of the same strength.

Corrosion was rapid at the start but lessened after the first week and at the end of the period it was practically nothing. Actually, the block weighing 650 g. lost 3.642 g. in the first seven days and 0.4639 g. in the next nine days. In the last 177 days it lost only 1.132 g. The average loss per day after 39 days was only 0.0051 g. per day.

It was found that a protective coating of calcium and iron salts formed on the concrete, resisting further erosion. A similar coating was found on the walls of a concrete coal storage pit which had been exposed to the action of the acid water from coal for more than two years. There was no

indication that corrosion had penetrated the concrete for more than  $\frac{1}{8}$ -in. This pit was made of a dense concrete a 1:2.6:3.4 mix. Density was found important in resisting corrosion from this as from other causes.

The conclusion reached is in effect that dense concrete properly placed and cured, will not disintegrate beyond the surface in the acid water of coal storages. It is therefore an excellent material for structures in which coal is to be stored.

Efforts to neutralize the acid water by contact with crushed limestone failed because the limestone was soon covered with the same protective coating.

### Accuracy of Absorption and Specific Gravity Tests of Coarse Aggregate

**A**BSORPTION and apparent specific gravity of aggregates must be determined for the really scientific design of concrete in large work, the absorption affecting the water-cement ratio and the specific gravity the quantity required per yard. The standard methods of testing for these characteristics has been investigated by the U. S. Bureau of Public Roads and a report was made in *Public Roads*, Vol. 10, No. 8, by D. O. Woolfe of the division of tests.

The method of determining specific gravity tested is that of lowering a 1000-gram sample, broken into pieces of about  $1\frac{1}{2}$ -in. dia. into a cylinder filled with water to an overflow spout. The water which overflows is caught and weighed and the specific gravity figured in the usual way. The test needs some care and attention to details which are described in the article.

To determine absorption, the sample, dried and cooled, is weighed and then immersed in water for 24 hr. It is then wiped dry with a towel and weighed and the increase in weight is credited to absorption.

To avoid the effect of absorption on the specific gravity test, the sample is tested first for absorption and it is placed in the cylinder for the specific gravity test immediately after the second weighing.

The absorption test was studied by having four different operators make it on the same samples and also by having a single trained operator make it on several samples of the same material.

The accordance with different operators working with the same sample was fairly good, although the samples varied widely, running from a limestone with 0.20% to a gravel with 2.50% absorption. The mean deviation from the average was 0.02% and the maximum deviation was only 0.07%. But in the tests made by the same operator on different samples of the same material the variations were very wide, a fair example being a maximum of 1.45% and a minimum of 0.41%.

With the specific gravity tests the con-

cordance was even closer with the operators working on the same sample, the average variation being 0.01% and the maximum only 0.02%. But the results of specific gravity tests on different samples of the same material showed a wide variation, although not as wide as with the absorption test.

Test methods were found to be correct, the variations in samples and not variations due to either the method or the operator giving concordant results. It is suggested that the average of several tests be taken, using a different sample of the material for each of these. Better results might be obtained by using a larger sample, but the difficulties of doing this without designing special apparatus make it better to use the average from a number of tests.

### New Chromite Cement Developed for High Temperature Use

**B**OTFIELD Refractories Co., Philadelphia, Penn., has developed a new high temperature cement which will be added to its line of "Adaproducts" and sold under the trade name of "Adachrome Plastic Super-Cement." In this new cement, the basic material is an exceptionally high-grade chromite ore obtained from South African deposits.

Because of its chromite base, the new cement is claimed to be chemically-inert, and is also hard, dense and highly refractory. It employs a bonding agent which is said to be quite efficient at high temperatures.

Among the destructive furnace actions to which this new cement is claimed to be resistant are basic and acid slags, molten metal penetration, abrasion, erosion and chemical reaction in the burning of acid sludge. In addition, the material, when applied as a surface coating on boiler settings, protects the brickwork from the penetrating action of clinker and fusible coal ash.

Another feature of the new cement is its plasticity, which contributes to ease of handling and working. The material is recommended by its manufacturer for laying up fire clay brick, silica brick, chrome brick, high alumina brick and also for laying up magnesite brick under certain conditions. It is also adaptable for use as a surface coating material, and as a binder in the mixture of patching materials for repairing burned-out sections of refractory construction.

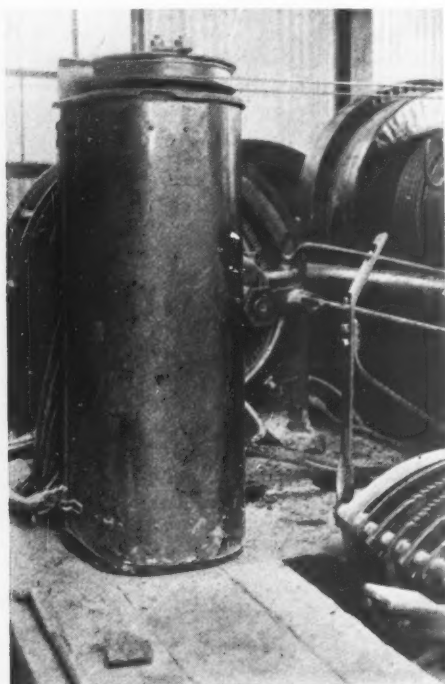
The cement is sold in plastic form, ready for use without laborious mixing prior to use. The material is suited for making either dipped or troweled joints. This new cement will be packed in heavy gage metal drums with full-size openings adding to convenience of use. The drums have air-tight covers that prevent waste or deterioration of the material. Two sizes of drums, 250 lb. and 500 lb., are available. Complete data is offered by the manufacturer to those interested.



# Hints and Helps for Superintendents

## Ingenious Hoist Control

**T**HE BETHLEHEM Mines Corp., Naginney, Penn., has a quite clever and ingenious method of control for operating the hoist used for dumping the 70-ton capacity cars at the primary crusher. The hoist has four drums, although only one is used for dumping, as once the location of the stiff-leg derrick boom has been set, it is not often that it has to be moved; hence the dumping



*Used by Bethlehem Mines Corp.*

operation, as far as the hoist is concerned, is simply a raising and lowering of the lift line.

At a point directly alongside the crusher is a small room for the crusher operator, in which are located the two levers for operating the drum control of the hoist motor. In place of the usual handle on the top of the drum controls to start and stop the electric motor, a small pulley has been keyed. Two wraps of  $\frac{1}{4}$ -in. cable have been made around this pulley, with the two ends of the cable attached to levers in the control house at the crusher. This house is roughly 100 ft. from the drum control and the cables between these points are supported by neatly constructed and conveniently located guide

posts and pulleys. By this hook-up the hoist can be started, stopped, reversed, slowed down, etc., by the crusher operator.

## Identifying Age of Plaster

**G**YPSUM plasters when stored for any considerable time lose some of their capacity to carry sand, or, in other words, if a normal amount of sand is mixed with this aged material it feels grainy and is not easily applied. Every plaster manufacturer is interested in seeing that his customers' warehouses are kept in such condition that the movement of plaster through the house is such that none will be allowed to accumulate or become unduly old. A system whereby the oldest plaster on hand goes out first is his desire. Further, a plaster manufacturer will not sell a dealer more plaster than he can dispose of in a reasonable time; that is, he won't if he has the best interests of the industry at heart.

Quite often plaster through some cause or other is allowed to accumulate in the dealer's warehouse and consequently becomes defective. This material when sent out on the job causes trouble and complaints follow. The dealer may think that the plaster is fresh and blame the mill for the short working plaster. Thus to judge the age of sacked plaster in the warehouses one mill stencils in code the date that the sack was shipped on all the paper sacks shipped that day. This work is done by the regular sacking crew and no extra labor is required.

When a complaint comes in to the sales manager that the plaster is working short he can send someone to the job and by inspecting the empty paper sacks determine the exact age of the material. If the plaster is over six weeks old, he has a talking point to protect his company's interests, as he also knows the tonnage that moves through the particular warehouse each week and can accurately determine whether or not the warehouseman slipped and allowed plaster to become old and stale on his hands. On the other hand, if the plaster is not old, the mill can be informed and production and laboratory records referred to for that particular shipment and the cause of the trouble ascertained.

The idea, of course, can only be used on paper containers, but since paper bags are

daily becoming more largely used, the scheme could be adopted to advantage by all gypsum or lime producers.

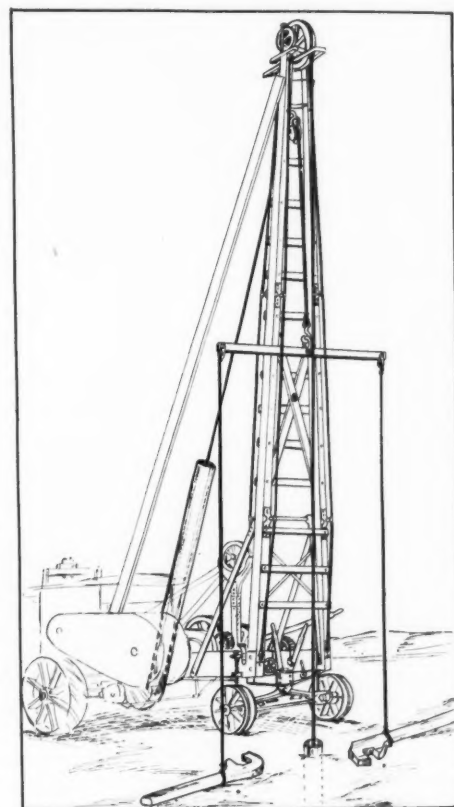
It has been suggested for jute sacks that wire ties stained different colors be used, having a different color for each day in the week. This idea would be of some help to determine the date of a shipment in many cases, especially where the dealer does not receive many cars each month.

## Lightening a Heavy Load

**L**IFTING 175 lb. wrenches for changing bits in well drilling is quite a task, so the writer rigged up the following arrangement:

The wrenches are suspended from a 3 ft. bar and the bar is attached to a wire cable which runs a pulley (trolley wheel) and is connected to a counter weight which slides through a projecting pipe.

The weight being over 300 lb. the workmen, in lifting the wrenches, lift only 50 lb.



*Makes heavy wrenches lighter*

between them. This not only lightens the load but makes the wrenches always accessible.—W. C. Barlow, Plainville, Conn., in *The Explosives Engineer*.

### Testing Sheet Steel to Determine Suitability for Welding

**B**EFORE attempting to weld sheet steel, it is best to determine whether it is suitable for welding. The chemical analysis is not a sufficient indication. A simple test, easily applied, is proposed by the Linde Air Products Co., New York, and this is as follows:

Select a piece of sheet steel from the lot, about 6 in. square, and place it flat on the welding table. Fit a welding tip to the blowpipe or size smaller than that prescribed for work on your welding chart. Light the blowpipe and adjust the flame to neutral. Hold the blowpipe so that the tip of the inner cone of the flame is about  $\frac{1}{8}$  in. away from the sheet. Move the flame slowly along a straight line so that the sheet will be melted without burning clear through. After a strip about 3 in. long has been melted in this way, hold the blowpipe still until a hole is burned through the sheet.

If the sheet is high grade the path followed by the blowpipe will be free from an excess of oxide or scale and regular and smooth on the upper side. The under side of the test sheet will show a slight sag of smooth metal, free from oxide. The hole will be round and have smooth, rounded edges.

Inferior sheet shows an oxide deposit on the upper side, the hole is irregular with ragged edges and there may be a series of small holes blown through by the sparking action.

### Cleaning Le Chatelier Cement Testing Flasks

**T**HE Chatelier specific gravity flasks are difficult to clean because of the small graduated stem. When testing portland cement, benzine or kerosene is used in the flasks so that the cement will not "set up" and prevent the use of the bottle again. If inadvertently a few drops of water should get in the flask, particles of cement will adhere to the inside, and it is almost impossible to remove these by the usual methods. Here is a simple process.

I have found that these cement particles can be cleaned out very thoroughly with the use of sand. A small quantity of coarse sand (Ottawa sand is usually available and convenient) is poured into the flask with a little kerosene and the flask is shaken vigorously. Unless the cement has been allowed to set up completely, it will be found that this method will prove quite effective.—Harry Tucker in *Engineering News-Record*.

### Protecting Electric Power Cables in Quarry

By LOUIS M. CASSAYRE

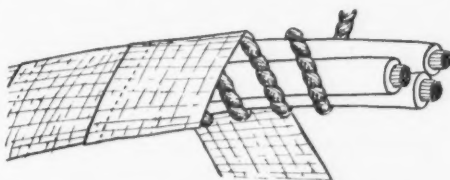
Superintendent, Basalt Rock Co., Napa, Calif.

**D**UE TO THE SEVERE ABUSE given electric power cables leading to an electric shovel, a great deal of care must be taken to protect the cables and thereby protect the person handling them.

The form of protection used by the Basalt Rock Co. at its plant in Napa, Calif., is quite unique but very effective.

The three rubber-covered electric cables leading to the shovel are laid very closely and evenly together. They are then bound with strands of rope as one might wrap a fishing pole, although with the loops not so close together, so as to allow flexibility to the cable.

When this is completed the wrapped cables are dipped into hot asphalt and held for a few seconds, giving the asphalt time to seep its way thoroughly into the



Strands of rope and asphalt-dipped canvas used for protecting electric power cables

strands of rope and between the electric cables.

To further safeguard the cables, strips of heavy canvas about  $3\frac{1}{2}$  in. wide and 60 ft. long are used. The company usually has a bolt of canvas about 20 yd. long and 1 yd. wide cut into strips about  $3\frac{1}{2}$  in. wide at a local paper box factory which has a paper cutter.

The strips of canvas are dipped into a pot of boiling asphalt and from there are fed into a tub of cold water, which immediately solidifies the asphalt on the canvas, allowing one to handle it without any trouble. These strips are then wrapped around the asphalt-covered cables and strands of rope as tightly as possible. The two surfaces (the canvas and rope strands) are covered with asphalt and in time they adhere to each other very effectively. The fact of the matter is that when replacement of the canvas is necessary they have to be torn apart. The ordinary life of the canvas up close to the shovel is about one year, but the rope will last for many years if the canvas is replaced in time. The canvas will, after a period of time, wear in

places from being dragged back and forth.

Just a common roofing asphalt is used, and care must be taken not to dip the canvas or rope covered cables into asphalt which is not sufficiently heated, as it will not find its way into all the crevices and will make the finished lead an awkward affair to handle.

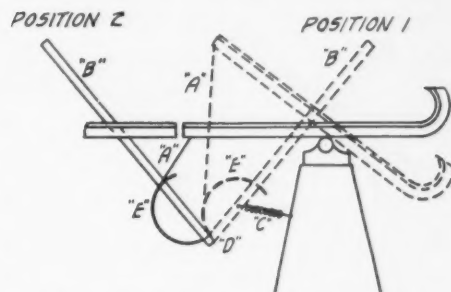
### Throw-Back for an End Tipple Dump

J. PALMER CAMM

Watonga, Okla.

**T**HE accompanying cut illustrates a throw-back for an end-tipple dump which has been in use for over a year at our operation, and in that time has worked out quite satisfactorily.

The dotted portion of the sketch shows the tipple in the dump position. Rope "A" is then stretched fairly tight. Lever "B" is in its constant position except when being used to pull the tipple back. By pulling lever "B" to position 2 the tipple is thrown back. Lever "B" will now go back to its position 1 through action of spring "C." Lever "B" is pivoted at point "D." Rim "E" takes up the rope as the lever is thrown from position 1 to position 2. One end of rim "E" is placed close to point "D" so that when the tipple is in dump position the maximum force will be exerted on the tipple to get it started back. As the tipple comes back, less and less force is needed to



Throw-back for an end tipple dump

pull it. At this place, rim "E" is taking up more and more of the rope. Spring "C" serves to keep the lever in position 1 so that there will be no danger of the lever being damaged by dumping a car when in position 2.

### Loading Blast Holes

**I**N LOADING a deep well drill hole, when a jagged portion is reached, common practice is to slit the cartridge and allow the dry powder to flow into the hole. After that portion of the jagged hole has been passed, the balance of the powder in the cartridge form is put in. Often the walls of the hole become coated with a layer of powder dust, which from friction, when the cartridges are later dropped into the drill hole, may become ignited and result in a premature blast.

### New Appointments of the Universal-Atlas Cement Company

**A**PPPOINTMENTS in the offices of the secretary and the treasurer of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., were made public recently by B. F. Affleck, president of the company. The new company was formed this year by the union of the Atlas and the Universal organizations.

Richard B. Hynes, formerly assistant secretary and assistant treasurer of the Atlas Portland Cement Co., has been appointed secretary of the new Universal Atlas company. Mr. Hynes was in the secretary's department of the former Atlas organization since 1916. Since 1925 he was assistant secretary and assistant treasurer of both the Atlas Portland Cement Co. and of its subsidiary, the Atlas Gypsum Corp. Mr. Hynes will be located at the Universal Atlas headquarters in Chicago.

Born and reared in Chicago, T. E. O'Connor of New York, appointed treasurer of the Universal Atlas Cement company, will be returning to his home city when he takes up his new duties. Previously western credit manager for the former Atlas company with offices in Chicago, Mr. O'Connor in 1924 was called to the executive offices of the company in New York and assigned to the treasury department. In this position he handled credits, collections, cash accounts and similar treasury work. Later he was selected as assistant to the treasurer and secretary of the Atlas company. In this capacity he supervised cash accounts of its subsidiary companies and assisted in the discharge of general treasury duties. Mr. O'Connor was connected with Atlas for thirteen years, beginning as assistant to the western credit manager, to which position he later was promoted. In addition to his experience with Atlas, he was in charge of credits, collections and accounting for two years for the Audebert Wall Paper Mill of Chicago and prior to that connection was associated with Murphy Brothers, live stock commission merchants of Chicago. He graduated from a Chicago high school and later specialized at Northwestern University in courses on credits, accounting, economics and business law. Mr. O'Connor is a veteran of the world war.

A. J. Joyce, formerly assistant credit manager of the Universal company and now appointed assistant treasurer at Chicago for the Universal Atlas company, has had twenty-three years' experience in this field. He was connected with Universal for fourteen years and with the Illinois Steel Co. and the Illinois Steel Warehouse Co., two other subsidiaries of the Steel corporation, for seven and two years respectively. He installed the credit department at the north works of the Illinois Steel Co. and at the St. Paul office of the Illinois Steel Warehouse Co. Before his connection with sub-

sidaries of the Steel corporation, Mr. Joyce for four years was associated in a reportorial capacity with Chicago daily newspapers. He is a member of the Chicago Credit Men's Association and the author of articles and addresses on "Functions of a Credit Manager," "Trade Acceptances" and others.

E. M. Johnson, for twelve years eastern credit manager of the former Universal company and now named assistant treasurer at Pittsburgh of the new company, was connected with the former Universal company for twenty-three years. Previously he spent several years with the Illinois Steel Co. and other companies in various positions. Before his appointment as eastern credit manager, Mr. Johnson was assistant credit manager at



S. G. McAnally

the company's main office in Chicago. During his connection with Universal he was responsible for several changes in methods of keeping records and compiling information in the credit department which resulted in more efficient operations.

J. L. Medler, member of the former Atlas organization for twenty-eight years and its assistant treasurer since 1911, is named assistant treasurer at New York of the Universal Atlas company. For two years he was president of the New York Credit Men's Association and for four years was treasurer of the Crescent Athletic Club in Brooklyn, where he resides. Prior to joining the former Atlas company in 1901, he was connected with the Central Railroad of New Jersey. In addition to his high school and collegiate education, he received a master's degree in law and was admitted to the

bar of the state of New York.

W. H. Dutcher, for nearly 24 years purchasing agent for the former Atlas Portland Cement Co., has been appointed purchasing agent for the Universal Atlas Cement Co. Mr. Dutcher's connection with Atlas began 26 years ago when he was made manager of the metropolitan sales department in New York. After several years in that position he was called upon to establish a central purchasing department and was named purchasing agent. He later also was appointed purchasing agent for various subsidiaries of the Atlas company as these were organized. These included the Northampton and Bath railroad, the Hannibal Connecting railroad, the Atlas Transportation Co., the New York and New England Lime and Cement Co., the Atlas Gypsum Corp., the Atlas Lumnite Cement Co., the Atlas Portland Cement Co. of Kansas, and the Atlas Portland Cement Co. of Texas.

Prior to his connection with Atlas, Mr. Dutcher was in the New York offices of the Standard Oil Co. for 7 years and then for 7 years was associated with Pratt and Lambert, manufacturers of varnishes and driers.

Mr. Dutcher was a member of the Purchasing Agents' Association of New York City, being active on its coal committee, and also was a member of the National Association of Purchasing Agents. He was a member, and at one time a governor of the Drug and Chemical Club of New York. He was a member of the Crescent Athletic Club of Brooklyn, where he lived, and was an associate member (son of a veteran) of Grant Post G. A. R.

### New Chief Chemist of the Giant Company

**S.** G. McANALLY, recently appointed chief chemist of the Giant Portland Cement Co., Egypt, Penn., entered the portland cement industry in 1912 as assistant chemist at the Hull plant of the Canada Cement Co. The two following years he was chemist in charge of the Exshaw plant of the same company. From 1915 to 1917 he was works and research chemist for the British Portland Cement Manufacturers, London, England. From 1917 till 1920 he had charge of the operations (manufacturing magnesite refractory) at the Hull plant of the Canada Cement Co.

In 1920 Mr. McAnally went to Mexico as chemist and assistant superintendent for the Tolteca Cement Co.; went to Nevada in 1921 and remained till 1929. During these eight years he was engaged in the gypsum industry as chemist for the Pacific Portland Cement Co., Mound House, Nev., and chemist and superintendent for the Standard Gypsum Co., Ludwig, Nev.

He re-entered the cement industry in 1929 with the Cowell Portland Cement Co., Cowell Calif., and remained there until he made his recent change to the Giant Portland Cement Co., at Egypt.

## Editorial Comment

The prompt signing by the President of the act of Congress increasing federal aid for highways from \$75,000,000 per year to \$125,000,000, and the equally prompt proportioning of this additional \$50,000,000 to the various states, by the Department of Agriculture, is ample guarantee of the immediate future of highway construction. While in itself not a very important item in our current annual expenditures for highway construction, the additional \$50,000,000 has a very considerable influence in encouraging state and local activities.

In one way or another gradation has always been something of a plague to the producers of aggregates.

**Gradation of Aggregates** Along in the early part of the century the pundits of concrete engineering thought that it had to be plotted to some ideal curve such as Fuller's. Later the all-importance of the fineness modulus was insisted upon. In the last two years the advantages of a gradation that would give the lowest voids has been stressed, and at present various engineers are impressed with the benefits of aggregates of large size, and tests have been carried on to show how much cement can be saved by making the gradation coarse enough.

It is admitted that the knowledge that has come from the study of aggregate characteristics has been invaluable and that the concrete industry has immensely profited by it. So it is not in any attempt to depreciate it or to be disrespectful to those who have patiently studied the effect of characteristics in the laboratory that this is written. But there is such a thing as standing too close to one part of a thing to see the whole of it, and one is sometimes reminded of the six wise men of Hindustan and their conclusions about the elephant, when he notes how the importance of one characteristic after another has been over emphasized.

Size is an important characteristic of coarse aggregate and, generally speaking, the strength of concrete increases with the increase in size of the aggregates, cement content and consistency being constant. But the "sand-gravel" makers of Omaha, and some other places where coarse aggregate is scarce, have shown that entirely satisfactory concrete with a reasonable cement content can be made from what is little more than a coarse sand which has been carefully graded in the manufacturing process. Low voids mean a high yield, with a constant cement content, but if everyone insisted on having the lowest possible voids, aggregates would soon rise to the price of cement and producing plants would be buried in wasted material. Goldbeck and others have shown that very wide variations in gradation do not affect the voids sufficiently to make

much difference in the strength of concrete or the cement content. Fineness modulus is an important characteristic, but it is not enough in itself to determine the concrete making value of an aggregate, and even those who developed its use no longer insist upon its being the basis of the design of concrete mixes. As for gradation per se, Fuller himself found only 14% difference in strength between the best and the poorest gradations with which he experimented, and Walker and Proudley have shown that the widest variations that could occur under A.S.T.M. specifications affect the strength less than 10% from the mean.

So far as the records show, there is no single, supreme characteristic from which the concrete making value of an aggregate may be judged. And research has not gone far enough to assign definite values to any particular characteristic. Until it does we can get along very well by observing general principles and using carefully made trial and error tests for the more important jobs. Usually the producer of aggregates has been through this times enough so that he knows the possibilities and limitations of his deposit and his product and he is quite willing to pass on what he knows to his customers. At least this is true of the producers who read technical papers and belong to the producers' associations. And they have the assistance of well equipped research bureaus to help them with particular as well as general information. With such information in hand it is easy for the minds of reasonable producers and consumers to meet.

And the last word must always be given to the economic factor, the best aggregate to use being that which makes concrete that is satisfactory in strength, workability and durability at the least cost. Intelligent users of aggregate recognize this but there are purchasers who have been too much impressed by the importance of size, especial gradation or some other characteristic. They are not willing to accept laboratory and field tests even when these are backed by records of satisfactory use. It is not enough for them that an aggregate makes and always has made a concrete that is thoroughly satisfactory for the purpose they have in mind; they want it to come up to some theoretical standard in addition to this.

Such a mental attitude has resulted in the confusion of specifications by which an aggregate may be rejected by a city and accepted by the county and state in which the city is located, and in private construction one engineer may reject what another is very glad to accept. Those who are responsible for such an absurd situation are the engineers who have been altogether too much impressed with the value of a single characteristic and its theoretical importance.

# Financial News and Comment

## RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend	Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's <sup>29</sup>	4-7-30	88			Lehigh P. C. pfd.	4-7-30	107 1/2	108 1/2	1 3/4 % qu. Apr. 1
Alpha P. C. new com.	4-7-30	36 1/2	38 1/2	75c qu. Apr. 15	Louisville Cement <sup>18</sup>	4-7-30	250		
Alpha P. C. pfd.	4-5-30	110		1.75 qu. Mar. 15	Lyman-Richey 1st 6's, 1932 <sup>18</sup>	4-5-30	97	99	
American Aggregates com. <sup>29</sup>	4-7-30	20	25	75c qu. Mar. 1	Lyman-Richey 1st 6's, 1935 <sup>18</sup>	4-5-30	97	99	
Amer. Aggregate 6's, bonds	3-26-30	85			Marblehead Lime 6's <sup>14</sup>	4-5-30	94	98	
American Brick Co., sand-lime brick	4-7-30		5	25c qu. Feb. 1	Marbelite Corp. com.	4-4-30	325		
American Brick Co. pfd., sand-lime brick	12-13-29		80	50c qu. Feb. 1	Marbelite Corp. pfd.	4-4-30	12 1/2		50c qu. Apr. 10
Am. L. & S. 1st 7's <sup>29</sup>	4-7-30	95			Material Service Corp.	4-7-30	21 1/2	25	50c qu. Mar. 1
American Silica Corp. 6 1/2's <sup>10</sup>	4-8-30	No market			Medusa Portland Cem.	4-8-30	99	101	1.50 Apr. 1
Arundel Corp. new com.	4-7-30	45 1/4	45 1/2	75c qu. Apr. 1	Mich. L. & C. com. <sup>8</sup>	4-5-30	35		
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.) <sup>10</sup>	4-8-30	No market			Missouri P. C.	4-7-30	33 1/2	34	50c qu. Feb. 1
Beaver P. C. 1st 7's <sup>20</sup>	1-10-30		100		Monolith Portland Midwest <sup>9</sup>	4-3-30	4	5	
Bessemer L. & C. Class A <sup>4</sup>	4-4-30	32	33 1/2	75c qu. Feb. 1	Monolith bonds, 6's <sup>9</sup>	4-3-30	85	88	
Bessemer L. & C. 1st 6 1/2's <sup>4</sup>	4-4-30	85	90		Monolith P. C. com. <sup>9</sup>	4-3-30	7	8	40c s.-a. Jan. 1
Bloomington Limestone 6's <sup>29</sup>	4-7-30	80	85		Monolith P. C. pfd. <sup>9</sup>	4-3-30	7	8	40c s.-a. Jan. 1
Boston S. & G. new com. <sup>47</sup>	4-5-30	17	20	40c qu. Apr. 1	Monolith P. C. units <sup>9</sup>	4-3-30	21	24	
Boston S. & G. new 7% pfd. <sup>47</sup>	4-5-30	46	50	87 1/2c qu. Apr. 1	National Cem. (Can.) 1st 7's <sup>48</sup>	4-4-30	99 1/2		
California Art Tile A.	4-3-30		11 1/4	43 3/4c qu. Mar. 31	National Gypsum A. com.	4-8-30	6	8	
California Art Tile B.	4-3-30	4 3/4	6	20c qu. Mar. 31	National Gypsum pfd.	4-8-30	35	40	
Calaveras Cement 7% pfd.	4-3-30	86 1/4	89	1.75 qu. Apr. 15	Nazareth Cem. com. <sup>20</sup>	4-4-30	22		
Calaveras Cement com.	4-3-30	14 3/4	15		Nazareth Cem. pfd. <sup>20</sup>	4-4-30	98		
Canada Cem. com.	4-7-30	17 3/4	18		Newaygo P. C. 1st 6 1/2's <sup>28</sup>	4-7-30	101 1/2		
Canada Cem. pfd.	4-7-30	95		1.62 1/2 qu. Mar. 31	New Eng. Lime 1st 6's <sup>14</sup>	4-5-30	90	95	
Canada Cem. 5 1/2's <sup>48</sup>	4-4-30	99 1/4	100		N. Y. Trap Rock 1st 6's <sup>14</sup>	4-7-30	99 1/2	100	
Canada Cr. St. Corp. bonds <sup>48</sup>	4-4-30	95 1/4			N. Y. Trap Rock 7% pfd. <sup>20</sup>	4-4-30	95		1.75 qu. Apr. 1
Certaiteed Prod. com.	4-7-30	12 1/4	13		North Amer. Cem. 1st 6 1/2's <sup>14</sup>	4-5-30	68	69	
Certaiteed Prod. pfd.	4-7-30	35	44 1/2	1.75 qu. Jan. 1	North Amer. Cem. com. <sup>29</sup>	4-7-30	2	4	
Cleveland Quarries	4-8-30	67		75c qu. 25c ex Mar. 1	North Amer. Cem. 7% pfd. <sup>29</sup>	4-7-30	20	25	
Columbia S. & G. pfd.	4-8-30	97	105		North Amer. Cem. units <sup>29</sup>	4-7-30	22	28	
Consol. Cement 1st 6 1/2's, A.	4-8-30	80	89		North Shore Mat. 1st 5's <sup>18</sup>	4-8-30	98		
Consol. Cement 6 1/2's notes <sup>24</sup>	4-8-30	75	80		Northwestern States P. C. <sup>37</sup>	3-8-30	130		\$2 Apr. 1
Consol. Cement. pfd. <sup>29</sup>	4-7-30	65	75		Ohio River Sand com.	4-7-30	19	20	
Consol. Oka S. & G. 6 1/2's <sup>12</sup> (Canada)	3-21-30	101			Ohio River Sand 7% pfd.	4-5-30	99	102	
Consol. Rock Prod. com. <sup>4</sup>	4-3-30	2 1/2	5		Ohio River S. & G. 6's <sup>18</sup>	4-5-30	85	95	
Consol. Rock Prod. pfd. <sup>41</sup>	4-3-30	9	11		Oregon P. C. com. <sup>9</sup>	4-3-30	13	16	
Consol. S. & G. com. (Can.) <sup>10</sup>	2-8-30	No market			Pacific Coast Cem. 6's <sup>5</sup>	3-20-30	80	85	
Consol. S. & G. pfd. (Can.) <sup>10</sup>	4-7-30	83	86	1.75 qu. Feb. 15	Pacific P. C. com.	4-3-30	27	30	
Construction Mat. com.	4-7-30	23 1/4	24		Pacific P. C., new pfd.	4-3-30	77 1/2	84	1.62 1/2 qu. Apr. 5
Construction Mat. pfd.	4-7-30	48	48 1/2	87 1/2c qu. Feb. 1	Pacific P. C. 6's <sup>5</sup>	3-20-30	99 1/4		
Consumers Rock & Gravel, 1st Mtg. 6's, 1948 <sup>18</sup>	4-5-30	94	98 1/2		Peerless Cem. com. <sup>21</sup>	4-5-30	9	10	
Coosa P. C. 1st 6's <sup>20</sup>	4-7-30	50	60		Peerless Cem. pfd. <sup>21</sup>	4-5-30	80	85	1.75 Apr. 1
Coplay Cem. Mfg. 1st 6's <sup>40</sup>	4-5-30	90			Penn-Dixie Cem. pfd.	4-7-30	50 1/2	54	
Coplay Cem. Mfg. com. <sup>40</sup>	4-5-30	10			Penn-Dixie Cem. com.	4-7-30	9 1/2	10	
Coplay Cem. Mfg. pfd. <sup>40</sup>	4-5-30	70			Penn-Dixie Cem. 6's	4-7-30	79	80	
Dewey P. C. 6's (1942)	4-8-30	98			Penn. Glass Sand Corp. 6's	4-2-30	101 1/2	103	
Dewey P. C. 6's (1930)	4-8-30	98			Penn. Glass Sand pfd.	4-2-30	100		1.75 qu. Apr. 1
Dewey P. C. 6's (1931-41)	4-8-30	98			Petoskey P. C.	4-7-30	8 1/2	9	15c qu. Apr. 1
Dolese & Shepard	4-8-30	81	84	\$2 qu. Apr. 1	Port Stockton Cem., units <sup>9</sup>	2-17-30		30	
Edison P. C. com. <sup>20</sup>	4-5-30	10c			Port Stockton Cem. com. <sup>9</sup>	4-3-30		1	
Edison P. C. pfd. <sup>20</sup>	4-5-30	25c			Riverside Cement com.	4-3-30	11	15	
Giant P. C. com. <sup>2</sup>	4-5-30	8	15		Riverside Cement pfd. <sup>2</sup>	4-3-30	78	82	
Giant P. C. pfd. <sup>2</sup>	4-5-30	25	35		Riverside Cement, A <sup>9</sup>	4-3-30		16	31 1/4c Feb. 1
Gyp. Lime & Alabastine Ltd.	4-7-30	25 1/4	25 3/4	37 1/2c qu. Apr. 1	Riverside Cement, B <sup>9</sup>	4-3-30	4	5	
Hermitage Cement com. <sup>11</sup>	4-5-30	25	30		Roquemore Gravel 6 1/2's <sup>17</sup>	4-5-30	99	100	
Hermitage Cement pfd. <sup>11</sup>	4-5-30	80	85		Santa Cruz P. C. 1st 6's, 1945 <sup>5</sup>	3-20-30	105 3/4		6% annually
Hermitage Cement 6's <sup>11</sup>	3-8-30	101	104		Santa Cruz P. C. com.	4-3-30	91		\$1 qu. Apr. 1
Ideal Cement, new com.	4-7-30	53	55	75c qu. Apr. 1	Schumacher Wallboard com.	4-3-30	11 1/4	14	
Ideal Cement 5's, 1943 <sup>18</sup>	4-7-30	97	100		Schumacher Wallboard pfd.	4-3-30	23	24 1/2	50c qu. Feb. 15
Indiana Limestone com. <sup>29</sup>	4-7-30	No market			Southwestern P. C. units <sup>14</sup>	4-3-30	245		
Indiana Limestone pfd. <sup>29</sup>	4-7-30	No market			Standard Paving & Mat. (Can.) com.	4-7-30	23	23 1/2	50c qu. Feb. 15
Indiana Limestone 6's	4-7-30	72 1/2	73	\$1 qu. Mar. 28	Standard Pav. & Mat. pfd.	4-7-30	90 1/4	95	1.75 qu. Feb. 15
International Cem. com.	4-7-30	100 3/4	101 1/4	Semi-ann. int.	Superior P. C., A.	4-3-30	39	40	27 1/2c mo. Apr. 1
Iron City S. & G. bonds 6's <sup>10</sup>	1-24-30	80			Superior P. C., B.	4-3-30	12	13 1/2	25c qu. Mar. 20
Kelley Is. L. & T. new st'k.	4-8-30	41	42 3/4	62 1/2c qu. Apr. 1	Trinity P. C. units <sup>27</sup>	3-8-30	135	145	
Ky. Cons. St. com. V. T. C. <sup>48</sup>	4-3-30	9 1/2	10 1/2		Trinity P. C. com. <sup>27</sup>	3-8-30	50		
Ky. Cons. Stone 6 1/2's <sup>18</sup>	4-3-30	96	100		Trinity P. C. pfd. <sup>29</sup>	4-7-30	100	110	
Ky. Cons. Stone pfd. <sup>48</sup>	4-3-30	88	92		U. S. Gypsum com.	4-7-30	56 1/4	56 1/2	40c qu. Mar. 31
Ky. Cons. Stone com. <sup>48</sup>	4-3-30	9 1/2	10 1/2		U. S. Gypsum pfd. <sup>29</sup>	4-7-30	115	120	1.75 qu. Mar. 31
Ky. Rock Asphalt com. <sup>11</sup>	4-5-30	15	20	40c qu. Apr. 1	Universal G. & L. com. <sup>3</sup>	4-8-30	No market		
Ky. Rock Asphalt pfd. <sup>11</sup>	4-5-30	80	90	1.75 qu. Mar. 1	Universal G. & L. pfd. <sup>3</sup>	4-8-30	No market		
Ky. Rock Asphalt 6 1/2's <sup>11</sup>	4-5-30	90	100		Universal G. & L., V.T.C. <sup>3</sup>	4-8-30	No market		
Lawrence P. C.	4-5-30	57	63	\$1 qu. Mar. 29	Universal G. & L. 1st 6's <sup>3</sup>	4-8-30	No market		
Lawrence P. C. 5 1/2's, 1942	4-2-30	83			Warner Co. com. <sup>10</sup>	4-5-30	48	49	50c qu. Apr. 15
Lehigh P. C.	4-7-30	40 1/2	41 1/2	62 1/2c qu. May 1	Warner Co. 1st 7% pfd. <sup>10</sup>	4-5-30	101	104	1.75 qu. Apr. 1

†\$40,189 called for redemption at 106, Feb. 26, 1930. †\$105,000 called for redemption at 105, Feb. 25, 1930.

Quotations by: <sup>1</sup>Watling Lerchen & Hayes Co., Detroit, Mich. <sup>2</sup>Bristol & Willett, New York. <sup>3</sup>Rogers, Tracy Co., Chicago. <sup>4</sup>Butler Beadling & Co., Youngstown, Ohio. <sup>5</sup>Freeman, Smith & Camp Co., San Francisco, Calif. <sup>6</sup>Frederic H. Hatch & Co., New York. <sup>7</sup>J. J. B. Hilliard & Son, Louisville, Ky. <sup>8</sup>Dillon, Read & Co., Chicago, Ill. <sup>9</sup>A. E. White Co., San Francisco, Calif. <sup>10</sup>Lee Higginson & Co., Boston and Chicago. <sup>11</sup>J. W. Jakes & Co., Nashville, Tenn. <sup>12</sup>James Richardson & Sons, Ltd., Winnipeg, Man. <sup>13</sup>Stern Bros. & Co., Kansas City, Mo. <sup>14</sup>First Wisconsin Co., Milwaukee, Wis. <sup>15</sup>Central Trust Co. of Illinois. <sup>16</sup>J. S. Wilson, Jr., Co., Baltimore, Md. <sup>17</sup>Citizens Southern Co., Savannah, Ga. <sup>18</sup>Dean, Witter & Co., Los Angeles, Calif. <sup>19</sup>Tucker, Hunter, Dulin & Co., San Francisco, Calif. <sup>20</sup>Baker, Simons & Co., Inc., Detroit, Mich. <sup>21</sup>Hemphill, Noyes & Co., New York, N. Y. <sup>22</sup>A. B. Leach & Co., Inc., Chicago, Ill. <sup>23</sup>Richards & Co., Philadelphia, Penn. <sup>24</sup>Hincks Bros. & Co., Bridgeport, Conn. <sup>25</sup>Bank of Republic, Chicago, Ill. <sup>26</sup>National City Co., Chicago, Ill. <sup>27</sup>Chicago Trust Co., Chicago, Ill. <sup>28</sup>Boettcher Newton & Co., Denver, Colo. <sup>29</sup>Hanson and Hanson, New York. <sup>30</sup>S. F. Holzinger & Co., Milwaukee, Wis. <sup>31</sup>McPetrick & Co., Montreal, Quebec. <sup>32</sup>Tobey and Kirk, New York. <sup>33</sup>Steiner, Rouse and Stroock, New York. <sup>34</sup>Jones, Heward & Co., Montreal, Que. <sup>35</sup>Tenney, Williams & Co., Los Angeles, Calif. <sup>36</sup>Stein Bros. & Boyce, Baltimore, Md. <sup>37</sup>Wise, Hobbs & Arnold, Boston. <sup>38</sup>E. W. Hays & Co., Louisville, Ky. <sup>39</sup>Blythe Witter & Co., Chicago, Ill.

## INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked	Stock	Price bid	Price asked
Atlantic Gypsum Products Co. 6's, 1941, \$4,000 and 40 shs. com. <sup>1</sup>	35%		Consolidated Cem. com. v.t.c., 3220 shs. <sup>1</sup>	1 1/2 per share	
Atlantic Gypsum Products 6's, 1941, \$5,000; 50 shs. com. as bonus <sup>2</sup>	49%		Indiana Limestone deb. 7's, 1936, with warrants (\$1,000) <sup>4</sup>	\$500 for the lot	
			Universal Gypsum com. trust cts., 800 shs. <sup>3</sup> (no par)	\$5 for the lot	
			Universal Gypsum com., 300 shs. <sup>2</sup> (no par)	\$6 for the lot	

<sup>1</sup>Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. <sup>2</sup>Price at auction by R. L. Day & Co., Boston, Dec. 18, 1929. <sup>3</sup>Price at auction by Adrian H. Muller & Son, New York, Dec. 18, 1929. <sup>4</sup>Price at auction by Adrian H. Muller & Son, Dec. 26, 1929.

## International Cement's Annual Statement

THE ANNUAL REPORT of the International Cement Corp., New York City, gives the following data on its financial status as of December 31, 1929:

Consolidated net income for the year, after all charges including depreciation, depletion, interest on debentures and federal income taxes, amounted to \$4,950,433.16 as compared with \$5,149,388.19 for the year 1928. This is equivalent to \$7.88 per share on the 627,865 shares of common stock outstanding at the close of the year, as compared with \$7.90 per share on the 618,826 shares of common stock outstanding at the close of 1928.

Earnings for the year 1929 are accounted for in the following summary of income and disposition:

Income:	
Net income from operations.....	\$4,950,433.16
Net increase in depreciation and depletion reserves, for which there was no cash expenditure.....	2,772,083.66
	\$7,722,516.82
Disposition:	
Dividends paid .....	\$2,486,356.84
Invested in capital assets represented by plant enlargements, improvements and additional equipment .....	5,290,873.20
Increase in net current assets .....	199,204.34
Surplus adjustments, including obsolete equipment dismantled, less accrued depreciation; acquisition of minority interests in subsidiaries; deferred charges, etc.....	*253,917.56
	\$7,722,516.82

\*Credit.

Net capital expenditures during the year totaled \$5,290,873.20 of which the major investments were as follows:

Installation of filtering equipment at the New York plant for the purpose of securing greater fuel economy.

Acquisition of a waterfront property at Washington, D. C., and the construction of a modern terminal with packing station and dock facilities, together with the purchase of a steel barge for transporting cement in bulk from the Norfolk plant.

Installation of necessary equipment for the manufacture of "Incor" cement at the Spocari plant.

Installation of oil-burning equipment and storage facilities at the New Orleans plant, and the purchase of three additional steel barges for transporting raw material from the St. Stephens quarry.

Completion at the Dallas plant of new crushing and grinding installations and modern storage and packing facilities, and the purchase of electric shovels and other quarry equipment.

Acquisition of tidewater property and completion of a modern terminal and packing station at Nuevitas, Cuba, in the eastern part of the Island, and the construction of a modern steel Diesel motorship for transporting cement in bulk from the Mariel plant to Nuevitas. Also the purchase of a plant site with ample raw material deposits adjoining the Nuevitas terminal.

Installation of an additional waste heat boiler to effect fuel economy at the Argentine plant.

Additional quarry equipment to facilitate the handling of a larger tonnage at the Uruguayan plant.

Purchase of additional quarry land at Nazareth, Pennsylvania; Dallas, Texas; Sierras Bayas, Argentina; and also a plant site with necessary raw material deposit in West Texas.

As a result of these capital expenditures the company's total productive capacity at the close of the year was in excess of 22,000,000 bbl. per year, representing an increase of 2,000,000 bbl. over the productive capacity at the end of 1928—all in our foreign plants. This entire production is well located and the year's results, which were obtained notwithstanding very intense foreign and domestic competition, have again proven the value of the diversified geographical locations of our properties.

The demand for the company's high-early-strength cement, which is being marketed under the trade name of "Incor," has greatly exceeded the most optimistic expectation and during the year it became necessary to convert the Spocari plant to "Incor" production in order to supply the demand for this product. Shipments of "Incor" cement during the year increased materially over shipments for the previous year.

Average prices realized were lower than during 1928 due to intense competition created principally by dumping of foreign cement in coast territories, but some improvement in this situation has already taken place.

The prospect for securing a protective

tariff seems favorable at this time.

Continuous attention has been given to the reduction of costs and with the economies resulting from the various improvements made in the past the company succeeded in lowering the cost of production at all plants, and these reductions have to a large extent offset the low net price realized during the year.

During the year 1929 a number of the company's employees completed payment on the company's stock allotted to them under our employees' stock subscription plan, and about 9,000 shares of stock have been issued to these employees.

At the close of the year 1929 the company's capitalization was as follows:

Twenty-year, 5% convertible gold debentures, \$17,995,500.

Common stock (no par value), 627,865 shares.

## Iron City Sand Earnings

THE Iron City Sand and Gravel Co., Pittsburgh, Pa., reports 1929 gross of \$1,110,649, and net of \$314,585, before depreciation and bond interest. After allowing for depreciation of 140,353, net stood at \$174,232.

### TEN-YEAR GROWTH OF INTERNATIONAL CEMENT CORP., 1919-1929

Year	Productive capacity, barrels	Funded debt and notes	Capitalization		Sales	Total income	Interest, federal taxes, etc.	Net income	Balance for common	Earnings*
			7% cumulative	no-par shares						
1919	2,800,000	\$3,649,524	238,686	238,686	\$4,492,624	\$743,039	\$425,435	\$317,604	\$317,604	\$1.33
1920	3,200,000	2,636,938	268,139	268,139	8,461,896	2,564,009	784,450	1,779,559	1,779,559	6.62
1921	4,450,000	1,840,801	\$1,558,000	323,978	9,172,311	2,271,127	741,226	1,529,901	1,475,374	4.55
1922	4,450,000	1,627,758	1,409,700	324,047	9,407,725	1,862,080	437,033	1,425,047	1,318,031	4.06
1923	5,400,000	345,900	1,468,700	364,167	11,289,117	2,972,430	549,853	2,422,577	2,319,225	6.37
1924	7,000,000		3,411,800	400,000	13,683,503	3,771,397	723,890	3,047,507	2,853,917	7.14
1925	12,000,000		9,971,700	500,000	17,713,900	4,638,821	662,436	3,976,385	3,518,462	7.03
1926	14,700,000		9,694,400	562,500	21,623,582	5,236,220	881,020	4,355,199	3,669,441	6.52
1927	16,200,000		9,549,800	562,500	23,671,138	5,420,859	866,687	4,554,172	3,882,983	6.90
1928	20,000,000	18,000,000		618,826	27,595,096	6,576,494	1,427,105	5,149,388	4,893,012	7.90
1929	22,000,000	17,995,500		627,865	28,370,031	6,620,925	1,670,492	4,950,433	4,950,433	7.88

\*Per share of common stock.

### COMPARATIVE CONSOLIDATED INCOME ACCOUNT OF THE INTERNATIONAL CEMENT CORP.

	1929	1928	Increase
Sales, less discounts, allowances, etc.....	\$28,370,031.69	\$27,595,096.37	\$ 774,935.32
Cost of sales:			
Manufacturing and shipping cost.....	\$15,885,168.93	\$15,790,100.50	\$ 95,068.43
Provision for depreciation and depletion.....	2,772,083.66	2,442,300.10	329,783.56
Total cost of sales.....	\$18,657,252.59	\$18,232,400.60	\$ 424,851.99
Manufacturing profit.....	\$ 9,712,779.10	\$ 9,362,695.77	\$ 350,083.33
Selling, administrative and general expense.....	3,512,690.76	3,222,216.10	290,474.66
Net profit from operations.....	\$ 6,200,088.34	\$ 6,140,479.67	\$ 59,608.67
Miscellaneous income .....	420,837.64	436,013.93	*15,176.29
Total income .....	\$ 6,620,925.98	\$ 6,576,493.60	\$ 44,432.38
Interest on indebtedness, provision for income taxes and miscellaneous charges .....	1,670,492.82	1,427,105.41†	243,387.41
Net income for year carried to surplus account.....	\$ 4,950,433.16	\$ 5,149,388.19	\$ *198,955.03

\*Decrease. †Includes only eight months' interest on debenture bonds issued May 1, 1928.

### CONSOLIDATED SURPLUS ACCOUNT

Balance at December 31, 1928.....	\$11,982,485.07
Add: Net income for the year ending December 31, 1929.....	4,950,433.16
	\$16,932,918.23
Deduct:	
Surplus of subsidiary company in Argentina set aside in accordance with laws thereof .....	\$ 23,531.25
Increase in reserve for exchange on net current assets in South America and other net adjustments .....	69,108.53
Equipment dismantled principally in connection with reconstruction of Indiana plant, less depreciation accrued thereon.....	683,085.71
	775,725.49
	\$16,157,192.74
Deduct—Dividends paid:	
International Cement Corp.: Capital stock.....	\$2,484,648.84
Subsidiary companies: On capital stock not owned.....	1,708.00
	2,486,356.84
Surplus—Carried to balance sheet.....	\$13,670,835.90

## American Aggregates Corp. Annual Statement

**F**OLLOWING are extracts from the annual report of the American Aggregates Corp., Greenville, Ohio:

The net worth of the corporation increased during the year 1929 from \$6,607,199 to \$7,044,244. During the previous year (1928) extensive gravel properties were acquired in Cincinnati, Indianapolis and Detroit and in 1929 the assimilation was completed. To improve these and other properties \$800,000 was required for capital investment.

It was planned at the time of the acquisition of the properties to issue additional debentures to the extent of \$1,000,000 in order to replenish working capital taken from the corporation in the acquisition of the properties. All necessary steps had been taken to place these debentures on the market in 1929 with the firm of Taylor, Ewart and Co., New York City, when this brokerage firm failed. When this failure was followed by the memorable collapse of the securities market, it was determined by the board of directors not to proceed with the re-financ-

AMERICAN AGGREGATES CORPORATION AND SUBSIDIARIES (Consolidated Profit and Loss Account and Summary of Earned Surplus Account for the Year Ended December 31, 1929)	
Gravel plant and yards:	
Net sales	\$5,067,707.78
Cost of sales	3,267,422.54
Gross profit on sales	\$1,800,285.24
Selling, administrative and general expenses	639,376.52
Net operating profits—Gravel operations	\$1,160,908.72
Income from allied operations and affiliated companies	30,042.20
Net profits from gravel operations and income from allied operations and affiliated companies	\$1,190,950.92
Discounts allowed, less miscellaneous income (net)	220,913.36
Net profits before interest and federal income tax	\$ 970,037.56
Interest charges:	
Interest on bank loans, etc.	\$101,805.81
Interest on 6% debenture bonds	85,772.47
Amortization of bond discount and expense	19,690.13
	207,268.41
Net profits before federal income tax	\$ 762,769.15
Provision for federal income tax	93,085.85
Net profits, carried to surplus account	\$ 669,683.30
<b>Summary of Earned Surplus Account</b>	
Balance—January 1, 1929	\$ 676,527.63
Add—Net profits, as above	669,683.30
	\$1,346,210.93
Deduct—Cash dividends:	
7% preferred	\$167,569.50
Common	166,198.50
	333,768.00
Balance—December 31, 1929	\$1,012,442.93

ing and listing of the stock until the market conditions again somewhat approached normal.

As a result of the foregoing general circumstances, the cash position at the end of 1929 had not been improved over that of the year before.

Notwithstanding the impossibility of going ahead with the plans for additional financing, the corporation would have undoubtedly have been able to better its current cash position, but for a number of determining factors beyond its control. In the first place, general trade conditions in the cities were below normal; in the second place weather conditions were such that a late start was made in plant operations in the spring, and about two months was lost at the end of the season for the same reason; thirdly, the building program at Indianapolis was not completed in time to secure any advantage in earnings on the investment made at that point; fourthly, the highway program in Ohio, because of the change of administration, did not get well under way until the middle of the season.

Giving due consideration to all of the foregoing factors, the corporation enjoyed a fair year as a whole. Moreover, it has every reason to anticipate a more favorable situation during 1930. At Indianapolis there is every promise of a good season not only in the operation of the gravel plant but also with reference to the fill contract with the Union Belt Line and the river straightening contract with the city. The highway department of the State of Ohio has already launched a very ambitious program of road building and maintenance throughout the entire state.

Added to the favorable prospects during this season of 1930, the board of directors and officers have inaugurated policies of strict economy and retrenching in the matter of fixed overhead, of limiting additional capital investment to a nominal amount, in decreasing production costs wherever possible, by striving for a higher selling price level, and by a concerted, determined effort to

## COMPARATIVE CONSOLIDATED BALANCE SHEET OF THE INTERNATIONAL CEMENT CORP.

ASSETS				
Current assets:	1929	1928	Increase	
Cash in banks and on hand.....	\$ 1,937,088.94	\$ 2,387,787.93	\$ *450,698.99	
Marketable securities and accrued interest thereon.....	7,950.08	8,041.78	*91.70	
Accounts and notes receivable:				
Customers' accounts .....	\$ 2,390,050.42	2,055,878.32	334,172.10	
Miscellaneous accounts .....	201,272.03	108,021.53	93,250.50	
Notes receivable and accrued interest.....	80,998.91	120,569.38	*39,570.47	
	\$ 2,672,321.36	\$ 2,284,469.23	\$ 387,852.13	
	91,171.31	68,418.14	22,753.17	
Less: Reserve for doubtful items.....	\$ 2,581,150.05	\$ 2,216,051.09	\$ 365,098.96	
Inventories at cost or market, whichever is lower:				
Finished cement and process stocks.....	1,989,336.83	2,058,095.11	*68,758.28	
Packages, fuel and general supplies.....	3,648,173.01	3,399,118.39	249,054.62	
	\$ 5,637,509.84	\$ 5,457,213.50	\$ 180,296.34	
	\$10,163,698.91	\$10,069,094.30	\$ 94,604.61	
Deferred charges: Bond interest, prepaid expenses, etc.....	\$ 1,606,874.70	\$ 1,723,930.64	\$ *117,055.94	
Capital assets:				
Plant sites, mineral lands, rights, buildings, machinery, equipment, tools and furniture and fixtures, etc.....	\$58,557,577.10	\$54,704,944.72	\$ 3,852,632.38	
Less: Reserve for depreciation and depletion and other property reserves .....	14,703,281.32	12,686,352.77	2,016,928.55	
	\$43,854,295.78	\$42,018,591.95	\$ 1,835,703.83	
	\$55,624,869.39	\$53,811,616.89	\$ 1,813,252.50	
*Decrease.				
LIABILITIES				
Current liabilities	1929	1928	Increase	
Accounts payable .....	\$ 1,095,711.42	\$ 1,091,542.12	\$ 4,169.30	
Accrued interest and expenses.....	550,539.53	497,437.09	53,102.44	
Provision for income taxes .....	307,000.00	468,871.47	*161,871.47	
	\$ 1,953,250.95	\$ 2,057,850.68	\$ *104,599.73	
Employees' subscriptions to capital stock.....	\$ 388,664.30	\$ 559,616.40	\$ *170,952.10	
Funded debt:				
20-yr. 5% convertible gold debentures due May 1, 1948.....	\$18,000,000.00	\$18,000,000.00		
Less: Retired through conversion into capital stock.....	4,500.00		\$ 4,500.00	
	\$17,995,500.00	\$18,000,000.00	\$ *4,500.00	
Capital stock of subsidiary companies not owned.....	\$ 36,500.75	\$ 110,450.75	\$ *73,950.00	
Common stock:				
Authorized, 1,000,000 shares no par value†; issued and outstanding, 627,865 shares.....	\$21,448,552.99	\$20,993,180.74‡	\$ 455,372.25	
Surplus of subsidiary company in Argentina set aside in accordance with laws thereof.....	131,564.50	108,033.25	23,531.25	
Earned surplus .....	13,670,835.90	11,982,485.07	1,688,350.83	
	\$35,250,953.39	\$33,083,699.06	\$ 2,167,254.33	
	\$55,624,869.39	\$53,811,616.89	\$ 1,813,252.50	

\*Decrease. †197,951 shares reserved for conversion of debentures and 12,934 shares for officers and employees under subscription plan. ‡618,826 shares.

conserve resources and earnings wherever possible.

During the past year the territory was divided into districts, placing the sales and operation in such districts in charge of a district manager. The system has proven a wise one. Not only has it delegated authority from the home office, but, by the assumption of responsibility on the part of district managers it makes for greater efficiency and the training of capable men for future executive positions.

The tonnage sold during the year 1929 was 10,305,020 which is the largest tonnage ever

produced by this corporation in any one year, and, it is confidently believed, the largest tonnage ever produced in one year by any company in the industry.

Total depreciation charges absorbed in operations during the year amounted to \$441,390.83 as compared with \$323,004.85 for the year 1928.

Total depletion charges absorbed in operations during the year amounted to \$56,183.82 as compared with \$49,805.19 for the year 1928.

The corporation carries group life insurance on the lives of all employees who have

been continuously employed for five months. It also carries life insurance to the extent of \$500,000 on the life of the president of the corporation.

Workmen's compensation insurance is carried under the state fund of Ohio. Such insurance is carried with responsible companies in Indiana and Michigan.

Adequate public liability and property hazard is likewise insured with responsible companies.

Average number of employees during operating season was approximately 1,000.

Total annual payroll, approximately \$1,650,000.

During the year \$213,000 of the corporation's fifteen year 6% sinking fund gold debentures, Series A, due February 1, 1943, were retired, leaving outstanding at the close of the year \$1,317,500 of these debentures.

### Associated Portland Cement Common Dividend

ASSOCIATED Portland Cement Co. announces that after providing £267,150 for sinking fund, depreciation and reserves, company has recommended a common dividend of 8%, less tax, for 1929, unchanged from 1928.

### Ohio River Sand and Gravel Company Earnings

THE Ohio River Sand and Gravel Co., Parkersburg, W. Va., reports 1929 net of \$167,747, before depreciation and bond interest equal to about 4.5 times interest charges for the year. After allowing for depreciation charges of \$88,236, net was equal to \$79,511, or 2.1 times annual interest charges.—*New York (N. Y.) Herald-Tribune*.

### Called for Redemption

AN ISSUE of indenture bonds, dated May 1, 1924, and amounting to \$560,000, has been called for redemption on May 1 by the Hermitage Portland Cement Co., Nashville, Tenn.

### Recent Dividends Announced

Boston Sand & Gravel com.		
(qu.)	40c	Apr. 1
Boston Sand & Gravel pfd.		
(qu.)	87½c	Apr. 1
Coronet Phosphate com.	\$1.50	Apr. 1
Medusa Portland Cement com.		
(qu.)	\$1.50	Apr. 1
Medusa Portland Cement pfd.		
(qu.)	\$1.50	Apr. 1
New York Trap Rock \$7 pfd.		
(qu.)	\$1.75	Apr. 1
Northwestern States P. C.	\$2.00	Apr. 1
Pacific Portland Cement pfd.		
(qu.)	\$1.62½	Apr. 5
Peerless Cement pfd.	\$1.75	Apr. 1
Penn Glass Sand pfd. (qu.)	\$1.75	Apr. 1
Petoskey Portland Cement		
(qu.)	15c	Apr. 1
Wallace Sandstone Quarries		
Ltd. pfd. (semi-ann.)	\$1.50	Apr. 15

### BALANCE SHEET OF AMERICAN AGGREGATES CORP.

ASSETS		
Current assets:		
Cash		\$ 38,631.34
Accounts and notes receivable:		
Customers:		
Accounts	\$ 592,018.73	
Notes	157,638.41	
Other receivables	55,275.29	
	\$ 804,932.43	
Less—Reserve for bad debts	49,559.05	755,373.38
Inventories—Certified by the management as to quantities, valued at the lower of cost or market:		
Stock piles, manufacturing materials, supplies, etc.		266,121.38
Total current assets		\$1,060,126.10
Deferred stripping expenses, prepaid insurance, taxes, etc.:		
Deferred stripping expenses	\$ 95,788.80	
Prepaid insurance, taxes, etc.	50,038.10	145,826.90
Investments, advances, etc.:		
Investment in Permanent Concrete Products, Inc. (57.9% owned)	\$ 102,071.87	
Investment in American Materials Corp. (50% owned)	202,900.79	
Notes and accounts of stockholders and employees (less reserve)	53,521.74	
Cash surrender value of life insurance	18,694.19	
Advances for railroad rights of way, etc.—Refundable	72,881.53	
Miscellaneous (less reserve)	40,156.54	490,226.66
Plant and equipment:		
Gross book values	\$10,127,537.27	
Less—Reserves for depreciation and depletion	2,391,602.87	7,735,934.40
Deferred charges:		
Unamortized bond discount and expense	\$ 164,156.26	
Miscellaneous	87,223.70	251,379.96
		\$9,683,494.02
(Goodwill, etc., of \$1,508,088.52 was written off prior to 1929 by a charge of \$903,322.04 to appreciation surplus, \$462,016.52 to capital surplus, and \$142,749.96 to earned surplus.)		
LIABILITIES		
Current liabilities:		
Notes payable—		
Banks	\$ 250,000.00	
Others	22,720.00	\$ 272,720.00
Real estate purchase obligations due in 1930—Contracts	\$ 81,716.67	
Notes secured by purchase money mortgages	12,472.50	94,189.17
Accounts payable—		
Trade	\$ 96,620.59	
Officers and employees	8,403.76	
Miscellaneous	7,690.64	112,714.99
Dividend on preferred stock, payable January 1, 1930		42,001.75
Reserve for federal income taxes (subject to final review by Treasury Department)		98,289.68
Accrued liabilities:		
Taxes, interest, commissions, royalties, etc.		141,105.47
Total current liabilities		\$ 761,021.06
(Sinking fund payment due October 31, 1930, \$100,000)		
Deferred liabilities:		
Real estate purchase obligations, due 1931-1940—Contracts	\$ 360,047.67	
Notes secured by purchase money mortgages	35,392.50	
Notes payable to officers and employees, due June 30, 1931	129,695.06	
Miscellaneous	35,593.32	560,728.55
15-year 6% sinking fund gold debentures, series A, due February 1, 1943:		
Authorized and issued	\$ 2,000,000.00	
Less—Redeemed	682,500.00	1,317,500.00
Capital stock and surplus:		
Capital stock—		
Preferred—7% cumulative:		
Authorized 25,000 shares, par value \$100 each. Issued and outstanding 24,001 shares	\$ 2,400,100.00	
Common, without par value:		
Authorized 350,000 shares (of which 48,499 are reserved for the exercise of stock purchase warrants and options.) Issued and outstanding 223,909 shares	3,106,970.00	
	\$ 5,507,070.00	
Capital surplus	524,731.48	
Earned surplus	1,012,442.93	7,044,244.41
		\$9,683,494.02



## Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

### CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
	Mar. 8	Mar. 15	Mar. 8	Mar. 15
Eastern	2,291	2,268	2,683	3,077
Allegheny	2,363	1,181	2,695	2,972
Pocahontas	107	131	566	700
Southern	614	728	5,978	7,393
Northwestern	511	701	1,059	1,654
Central Western	405	526	5,694	7,394
Southwestern	307	311	5,027	6,605
Total	6,598	6,846	23,702	29,795

### COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

District	Limestone Flux Period to date		Sand, Stone and Gravel Period to date	
	Mar. 16	Mar. 15	Mar. 16	Mar. 15
Eastern	24,202	21,926	19,043	22,030
Allegheny	30,030	23,932	23,103	26,093
Pocahontas	1,462	1,761	3,479	5,543
Southern	4,624	6,196	69,163	63,694
Northwestern	5,871	5,204	9,898	10,087
Central Western	5,192	4,882	54,846	54,415
Southwestern	4,166	3,280	48,715	43,486
Total	75,547	67,181	228,247	225,348

### COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	75,547	67,181
Sand, stone, gravel	228,247	225,348

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 5:

### SOUTHWESTERN FREIGHT BUREAU DOCKET

19804. Crushed marble and stone, from points in the Southeast to points in the Southwest. To cancel rates on crushed marble and crushed stone, carloads, applying from Gantt's Quarry, Ala., Tate and Whitestone, Ga., and Knoxville, Tenn., to points in the Southwest, published in S. W. L. Tariffs Nos. 1-Q, 2M, 15N and 58Q. It is desired to cancel the through rates, owing to the fact that they are higher than those obtaining on basis of lowest combination of locals.

19805. Sand and gravel, from points in Mississippi to points in Arkansas. To establish rates on sand (except asbestos sand and silica sand), gravel, crushed stone (broken stone ranging in size up to 200 lb. in weight), in straight or mixed carloads (See Note 1), except that when car is loaded to full visible capacity, actual weight will govern, from Gravel Siding and Old Ham, Miss., to points in Arkansas on and east of the St. L.-S. F. Ry., from the Missouri-Kansas state line to Hoxie, Ark., thence on and east of the Missouri Pacific R. R. through Diaz, Bald Knob, North Little Rock, Little Rock, Pine Bluff, Gould and McGehee to Arkansas City, including Batesville and points on the Missouri Pacific Ry. east thereof, on the following basis:

Rates to be based on joint line scale prescribed by the Interstate Commerce Commission in Docket 17000, part 11, observing as minima the joint line

scale prescribed in Docket 17517, plus 6c per ton of 2000 lb. In computing distances, the shortest routes are to be used over which carload traffic can be moved without transfer of lading, distances to be figured as from Old Ham, Miss., this point being most distant from the destination territory. It is felt that the shippers at Gravel Siding and Old Ham should be accorded rates into the destination territory on the same basis as obtains from southwestern sand and gravel pits. However, southern lines are of the opinion that the rates suggested should be no lower than those applicable within the South, and accordingly are suggesting rates on the basis as outlined above.

19816. Chatts, cinders, crushed stone, etc., from Joplin, Mo., to Tulsa, Okla. To establish a rate of 7c per 100 lb. on chatts, cinders, crushed stone, gravel, ground limestone, sand, tailings, lead or zinc; (See Note 2), except when actual weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply, but in no case less than 40,000 lb., from Joplin, Mo., to Tulsa, Okla. The proposed rate, it is stated, is now published for account of other lines. For example, see M.-K.-T. R. R. Tariff 3015J. It is desired to establish the same rate for application in connection with the Midland Valley R. R.

### SOUTHERN FREIGHT ASSOCIATION DOCKET

49713. Phosphate rock, from Mt. Pleasant-Centreville district to Ahnapec and Western Ry. stations. In lieu of combination rates, it is proposed to establish through rate of 720c per net ton on phosphate rock, crude lump or crude ground, carloads, as described in and subject to minimum weight prescribed in L. & N. R. R., I. C. C. A15803, from the Mt. Pleasant-Centreville, Tenn., district, as described in L. & N. R. R., I. C. C. A15803, to A. & W. Ry. stations, Casto, Wis., through Sturgeon Bay, Wis., and Kewaunee, Green Bay and Western R. R., New Franken, Luxemburg and Casco Junction, Wis. Made with relation to rate to Green Bay, Wis.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

49720. Crushed stone, from Big Stone Gap and Glenita, Va., to N. & W. Ry., Saltville Branch and Abingdon Branch stations. It is proposed to establish, in lieu of lowest combination rates, through rates on: Crushed stone, carloads (See Note 3), from Big Stone Gap and Glenita, Va., to above named stations. Suggested rates to representative destinations are (rates are in cents per net ton):

To N. & W. Ry. Stations.	From	
	Big Stone Gap, Va.	Glenita, Va.
Litz, Va.	115	105
Plasterco, Va.	125	115
Abingdon Branch:		
Watauga, Va.	115	105
Green Cove, Va.	125	115
Carters, N. C.	135	125
Brownwood, N. C.	140	135

A complete statement of the proposed rates will be furnished upon request.

49750. Phosphate rock, from Mt. Pleasant-Centreville District to Amboy, North Grove, McGrawville, Loree, Bunker Hill and Onward, Ind. Present rate, 523c per net ton. Proposed rate on: Phosphate rock, crude lump or crude ground, as described in and subject to minimum weight prescribed in L. & N. R. R., I. C. C. A15803, from N. C. & St. L. Ry. and L. & N. R. R. stations in the Mt. Pleasant-Centreville District as described in above mentioned tariff, to the destinations just mentioned, 421c per net ton, same as the current rate to Logansport, Ind.

49761. Sand, molding, from Evansville, Ind., to Hampton, Ga. Present rate, 383c per net ton. Proposed rate on: Sand, molding, carloads, as described in Agent Speiden's I. C. C. 1314, from Evansville, Ind., to Hampton, Ga., 293c per net ton, same as current rate to Macon, Ga.

49790. Sand and gravel, from Johnsonville, Tenn., to Baxter, Tenn. Present rate, 162c per net ton. (Combination.) Proposed rate on sand and gravel, straight or mixed carloads (See Note 3), from Johnsonville to Baxter, Tenn., 152c per net ton, to apply only on Tennessee intrastate traffic.

49791. Gravel and sand, from Twohy Siding and Elko, Va., to Sunbury, N. C. It is proposed to establish reduced rate of 165c per net ton on gravel and sand (except glass and molding sand), carloads, minimum 100,000 lb. (when 90% of marked capacity of car is less than 100,000 lb., such 90% of marked capacity of car will apply as minimum), except when cars are loaded to their visible capacity actual weight shall govern, from Twohy Siding and Elko, Va., to Sunbury, N. C., made on basis of Docket 17517 scale, plus relief line arbitrary of 25c per ton.

49797. Phosphate rock, from Mt. Pleasant-Centreville, Tenn., district to Michigan Central R. R. stations. Combination rates now apply. Proposed rate on phosphate rock, crude, lump, or phosphate rock, crude ground, in bulk or in bags, carloads, minimum weight 30 tons of 2000 lb. from stations on the N. C. & St. L. Ry. and L. & N. R. R. in the Mt. Pleasant-Centreville district, as shown in L. & N. R. R., I. C. C. A15803, to Michigan Central R. R. stations, viz., Comber, Fargo, London, Welland, Windsor, Ont., and points on the M. C. R. R. taking same rates in Agent Jones' I. C. C. 1835, 603c per net ton, same as currently applicable to Hamilton, Ont.

49798. Handling charge on phosphate rock at Mobile, Ala. It is proposed to restore the handling charge of 2½c per 100 lb. on phosphate rock at Mobile, Ala., formerly published in Item 775 of Agent Glenn's Port Charges Tariff I. C. C. A688, in lieu of the 1½c charge published effective April 2, 1930.

49825. Ground limestone and/or chicken grit, in mixed carloads with lime, from southern points and shipping points in Pennsylvania, West Virginia and Maryland to southern points. It is proposed to amend the description now carried in Agent Glenn's Lime Tariff I. C. C. A684, in order to permit the mixture of ground limestone and/or chicken grit (limestone partially ground) with carload shipments of lime at the lime rates.

49845. Sand and gravel, from Nashville, Tenn., to Baxter, Tenn. It is proposed to establish rate of 90c per net ton on sand and gravel, in packages or in bulk (See Note 2), from Nashville, Tenn., to Baxter, Tenn., applicable on Tennessee intrastate traffic only, in lieu of the present rate of 90c per net ton when same is the property of federal, state, county or municipal governments, when consigned to such governments or an officer thereof, for use in building public highways, and 102c per net ton, except as provided above.

49853. Crushed stone, from Boxley, Va., to Hopewell, Va. Present rate, 120c per net ton. Proposed rate on crushed stone, carloads (See Note 3), from Boxley to Hopewell, Va., 105c per net ton. Proposed in order to enable competition with shippers at other points in Virginia.

### CENTRAL FREIGHT ASSOCIATION DOCKET

24346. To establish on crushed stone, carloads, from Ingalls, Ind., to Fowlerton and Blountsville, Ind., rate of 85c per net ton. Present, 11½c and 13c respectively.

24352. To establish on gravel and sand, carloads (See Note 3), from Massillon, O., to Lakeville, O., rate of 70c per ton of 2000 lb. Present rate, 80c per ton of 2000 lb. per Pennsylvania Tariff Ohio F1445.

Sup. 1 to W. D. A. 23950. White Docket Advice 23950, Docket Bulletin 1729, dated February 5, 1930, covering proposal to establish on sand and gravel, carloads, from Vincennes, Ind., to Switz City, Ind., rate of 70c per net ton, is hereby withdrawn from the docket.

24372. To establish on crushed stone, crushed stone screenings, etc., carloads, from Narlo, O., to Cincinnati, O., rate of 90c per ton of 2000 lb. Present rate, \$1.40 per ton of 2000 lb.

24388. To establish on sand and gravel, carloads, from Troy to Union City, Ind.-Ohio, rate of 95c per net ton. Present rate, 12c.

24401. To establish on sand, molding, etc. (Column A), carloads (See Note 2), from Sandale, Ind., and points in same group to Sheboygan, Wis., rate of 337c per net ton. Route—Via all rail. Present rate, 385c per net ton.

24455. To establish on sand and gravel (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and

silica), carloads, from Kenneth and Lake Giecott, Ind., to Monon, Ind., rate of 75c per net ton. Present rate, 80c.

24452. To establish on **crushed stone**, carloads, actual weight will apply, from Thrifton to points in Kentucky, rates as shown below. Proposed rates in cents per net ton:

	Prop.	Pres.†
Hodges, Ky. ....	127	22
Higginsport, Ky. ....	138	22
Springdale, Ky. ....	155	22
Trinity, Ky. ....	161	22
Pencil, Ky. ....	165	22
Buena Vista, Ky. ....	173	22
Garrison, Ky. ....	175	22

†Rate per 100 lb.

24457. To establish on **crushed stone**, carloads, from Sandusky, O., to Mt. Vernon, O., rate of 80c per net ton. Present rate, 90c per net ton.

24458. To establish on **sand**, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica, carloads, from Springfield, Penn., to points in Ohio, rates as shown in Exhibit A attached. Present rates, as shown in Exhibit A attached.

#### EXHIBIT A

N. Y. C. Points					
To	Prop.	Pres.	To	Prop.	Pres.
Toledo .....	140	176	Oak Harbor .....	140	176
Fremont .....	140	176	Sandusky .....	140	176
Clyde .....	140	176	Amherst .....	140	176
Bellevue .....	140	176	Pemberville .....	140	176
Oberlin .....	140	176	Fostoria .....	140	176

Also all intermediate points

C. C. C. & St. L. Points					
To	Prop.Pres.		To	Prop.Pres.	
Castalia .....	140	176	Green Springs..	140	176
Clyde .....	140	176			

H. V. Ry. Points					
To	Prop.	Pres.	To	Prop.	Pres.
Pemberville	140	176	Fostoria	140	176
N. V. C. & St. L. Points					

N. Y. C. & St. L. Points					
To	Prop.	Pres.	To	Prop.	Pres.
Vermillion	.....	140 176	Sandusky	.....	140 176
Avery	.....	140 176	Castalia	.....	140 176
Kimball	.....	140 176	Fremont	.....	140 176
Bellevue	.....	140 176	Burgoon	.....	140 176
Green Springs	.....	140 176	Fostoria	.....	140 176
Fostoria	.....	140 176	Maumee	.....	140 176

P. R. R. Points					
To	Prop.	Pres.	To	Prop.	Pres.
Latcha	140	176	Burgoon	140	176
Wabash R. R. Points					

Wabash R. R. Points			
To		Prop.	Pres.
Maumee .....	140	176	

W. & L. E. Points					
To	Prop. Pres.		To	Prop. Pres.	
Ironville .....	140	176	Monroeville .....	140	176
Oak Harbor .....	140	176	Norwalk .....	140	176
Fremont .....	140	176	Milan .....	140	176
Clyde .....	140	176	Huron .....	140	176
Bellevue .....	140	176			

24463. To establish on **crushed stone**, carloads, from Greencastle, Ind., to stations on the B. & O. R. R., rates as shown in Exhibit B attached. Present rates, as shown in Exhibit B attached.

#### EXHIBIT B

Crushed stone from Greencastle, Ind., to the

C. I. & L. Ry.

B. & O. R. R. Stations in Indiana

To	Pres.	Prop.	To	Pres.	Prop.
Washington .....	126	110	Ft. Ritner .....	110	110
Montgomery .....	126	110	Sparksville .....	126	110
Cannelburg .....	126	110	Medora .....	126	110
Loogootee .....	126	110	Vallonia .....	126	110
Martin .....	126	110	Brownstown .....	126	110
Shoals .....	120	110	Lehigh Spur .....	126	110
Tunnelton .....	110	105			

24469. To establish on **sand and gravel**, carloads, from Lafayette, Ind., to Sedalia, Ind., rate of 80c. Route—Via N. K. P., Frankfort, Ind., P. R. R. Present rate, 99c.

24477. To publish the following rates on **sand and gravel** (except engine, glass, grinding, molding or blast sand) from Lafayette to Romney, Ind., distance 12.9 miles—proposed rate 50c, present 65c; from Lafayette to Cherry Grove, Ind., distance 21 miles—proposed 60c, present 65c. The 50c rate to Romney, Ind., to expire December 31, 1930.

24485. To establish on **sand and gravel**, carloads, from Brinkhaven, O., to Coshocton, O., rate of 70c per ton of 2000 lb. Present rate, 80c per ton of 2000 lb.

24489. To establish on **limestone**, ground or pulverized, carloads, minimum weight 40,000 lb., from Piqua, O., to East Moline, Ill., rate of \$3.10 per net ton. Present rate, 25½c.

24492. To establish on **sand and gravel**, carloads, from Evansville, Ind., to Petersburg, Ind., rate of 73c per net ton. Present rate, 80c per net ton.

24496. To establish on **limestone**, **crushed or ground**, carloads, from Mosher and Ste. Genevieve, Mo., to destinations in Central Freight and Trunk Line territories, 1c per pound higher than the rates from Alton, Ill. Present rate, combinations of local rates using a proportional commodity rate of 2½c to Kellogg, Ill., as per Mo. Ill. R. R. Tariff No. 11D, plus 65% of sixth class rate beyond as

per Item 1670, Agent Jones' Tariff No. 130T, and Agent Jones' Tariff 400K and 218G.

24493. To establish on **sand** (all kinds) and **gravel**, carloads, from Kent Sand and Gravel Pit, O., to points in Ohio, rates as shown below. Present and proposed rates (rates in cents per ton of 2000 lb.):

To	Prop.	Pres.	To	Prop.	Pres.
Mentor .....	80	90	Willoughby .....	80	85
Wickliffe .....	80	85			

24494. To establish on **crushed stone**, carloads, from Greencastle and Limesdale, Ind., to stations on the N. Y. C. & St. L. R. R., rates as shown below:

Railroad	Station	Prop.	Stations	Prop.
N. K. P.	Handy .....	110	State Line .....	110
N. K. P.	Templeton .....	100	Covington .....	110
N. K. P.	Frankfort .....	105	Hammond .....	130
N. K. P.	Valparaiso .....	120	Lineville .....	130
N. K. P.	Knox .....	120	South Milford .....	140
N. K. P.	Argos .....	130		
N. K. P.	Fort Wayne .....	140		

The present rates are on classification basis.

24495. To establish on **crushed stone**, carloads, from Greencastle and Limesdale, Ind., to destinations on Wabash Ry., rates as shown below. Road—Wabash.

Stations	Prop.	Stations	Prop.
Butler .....	135	State Line .....	110
Huntington .....	120	Covington .....	110
Peru .....	110	Hammond .....	130
Delphi .....	100	Lineville .....	130
Attica .....	100	South Milford .....	140

Present rates, classification basis.

24498. To establish on **sand and gravel**, carloads, from Circleville, Kinnickinnick, O., and Ceredo and Kenova, W. Va., to points in Ohio, rates as shown in Exhibit A attached. Present rates, as shown in Exhibit A attached.

#### EXHIBIT A

Sand and gravel, carloads (See Note 3). Per ton of 2000 lb.:

From Circleville, O.			
To (Rep. pts.)	Miles	Pres.	P.S.M. Prop.
Columbus, O. ....	29	70	70 70
Lockbourne, O. ....	14	70	60 60
Hayesville, O. ....	5	70	60 60
Lumbeck, O. ....	23	70	65 65
Corwine, O. ....	38	80	80 80
Sargents, O. ....	49	80	80 80
George, O. ....	62	80	90 80
Wheelerburg, O. ....	77	110	100 100
Hanging Rock, O. ....	92	110	105 105
Ironton, O. ....	96	110	105 105
Coal Grove, O. ....	99	110	105 105
North Kenova, O. ....	106	120	115 115
Kenova, W. Va. ....	107	125	115 115

From Kinnickinnick, O.			
To (Rep. pts.)	Miles	Pres.	P.S.M. Prop.
Columbus, O. ....	42	70	80 70
Lockbourne, O. ....	27	70	70 70
Hayesville, O. ....	8	70	60 60
Lumbeck, O. ....	10	70	60 60
Corwine, O. ....	25	70	65 65
Sargents, O. ....	36	80	80 80
George, O. ....	49	80	85 80
Wheelerburg, O. ....	64	100	90 90
Hanging Rock, O. ....	79	110	100 100
Ironton, O. ....	83	110	100 100
Coal Grove, O. ....	86	110	100 100
North Kenova, O. ....	93	110	105 105
Kenova, W. Va. ....	94	115	105 105

From Ceredo and Kenova, W. Va.			
To (Rep. pts.)	Miles	Pres.	P.S.M. Prop.
Hanging Rock, O. ....	16	81	60 60
Ironton, O. ....	12	81	60 60
Coal Grove, O. ....	9	81	60 60
North Kenova, O. ....	2	81	60 60

24501. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, from Cedar, Ind., to Fort Wayne, Ind., rate of 63c per net ton. Present rate, classification rate.

#### TRUNK LINE ASSOCIATION DOCKET

23232. **Sand**, carloads (See Note 2), from Masonville to South Pemberton, N. J., inclusive, to Haddonfield, N. J., 80c per net ton. (Present rate, 92c per net ton.) Reason—Proposed rate is comparable with rates to Gloucester, South Westville and Island Heights, N. J.

23247. **Rough rip rap stone**, carloads (See Note 2). Proposed rate from Stockton, N. J., to Manasquan, N. J., 104c; Raven Rock, N. J., to Belmar, N. J., 115c. Present rate from Stockton, N. J., to Manasquan, N. J., 19c; Raven Rock, N. J., to Belmar, N. J., 17½c. Proposed rates in cents per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

23250. **Sand and gravel**, other than engine, foundry, glass, molding and silica, carloads (See Note 2), from Susequehanna, Penn., to stations on Penna. R. R. Proposed rate: Fassett, Gillett, Dunning, Snediker, Penn., 150c; Columbia X Roads, Troy, Cowley, Penn., 160c; Alba, Canton, Grover, Penn., 170c; Ralston, Bodine, Field, Gray,

Cogan Valley, Penn., 180c; Hepburnville, McKinney, Williamsport, Penn., 190c. Present rate: Sixth class. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

23249. **Limestone dust**, carloads (See Note 2), from Gladhill, Penn.

To W. M. Ry.	(*)	(†)
(Baltimore) stations	Prop.	Pres.
Fulton .....	90	19
Walbrook .....	90	19
Peddicord Siding .....	90	19
Leonard Siding .....	90	19
Washington Road Siding .....	90	19
Arnold Street .....	90	19
Mt. Winans .....	90	19
Westport .....	90	19
Port Covington .....	90	19
York Street .....	100	19
Fidelity .....	100	19
Wagners Point .....	100	19
Curtis Bay .....	100	19

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

\*Rate in cents per 2000 lb.

†Rate in cents per 100 lb., sixth class.

23259. **Sand, common, building and engine** (See Note 2), in open top equipment, from Cumberland, Md. (rates in cents per 2000 lb.):

To Stations—	Prop.	Pres.
P. & L. E. R. R. ....	130	140
Glassport to Brownsville, Penn. ....	130	140
Monongahela Ry. ....		
South Brownsville, Penn., to Cassville, W. Va. ....	130	140
Lemley to Brave, W. Va. ....	170	180
Randall to Fairmont, W. Va. ....	130	140
Century Coke Siding to Nemaquin, Penn. ....	130	140

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

23262. **Crushed stone**, carloads (See Note 2), from Jamesville, N. Y., to Erie Railroad points, Elmira Heights, Waverly, Endicott, Johnson City, Susquehanna, Carbondale, Thompson, N. Y., Lanesboro, Penn., Deposit, Hankins, Callicoon, Cocheton, Campbell, Morris Run, Tioga, Watkins, Warsaw, Rochester, Bradford, Olean, Lockport, Buffalo, Perysburg, Salamanca, Currys, Mt. Jewett, Narrowsburg, N. Y., and various. Rates ranging from \$1.20 to \$2.30 per net ton. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

23266. **Ganister stone**, carloads (See Note 2), from Cumberland, Md., to Bethlehem, Penn., \$2.90 per net ton. (Present rate 25½c per 100 lb., sixth class.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

23278. **Crushed stone**, carloads (See Note 2), to L. V. R. R. (rates in cents per net ton):

From	White	Hendlers, Haven, Penn.	Prop. rate	Prop. rate
Standing Stone to Wysox .....	110			
Towanda .....	110	120		
Monroeton .....	110	120		
Kellogg .....	110	120		
South Branch to New Albany .....	110	120		
Loddsburg .....	110	120		
Dushore .....	110	120		
Satterfield to Bernice .....	110	120		

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

#### ILLINOIS FREIGHT ASSOCIATION DOCKET

4754-C. **Crushed stone**, carloads (See Note 1), from Lehigh and Thornton, Ill., to Little Indian, Litterberry, Savage and Jacksonville, Ill. Rates per ton of 2000 lb.

From	Pres.	Prop.
Lehigh, Ill. ....	122	113
Thornton, Ill. ....		126

4883-C. **Sand, blast, foundry, glass and molding** (See Note 1), from Bowes, Ill., to Aurora, Ill. Rates in cents per ton of 2000 lb. Present, \$1.39; proposed, \$1.25.

5556. **Limestone**, ground or pulverized (in bulk), crushed or rough quarried, carloads (See Note 3), from East St. Louis, Ill., to Barr Compro, Girard, Schoper, Henderson, Ill., to representative points. Rates in cents per ton of 2000 lb.

To—	Pres.	Prop.
Barr, Ill. ....	*	101
Compro, Ill. ....	*	101
Girard, Ill. ....	*	88
Schoper, Ill. ....	*	88
Henderson, Ill. ....	*	83

\*Classification basis.

5563. **Molding sand**, carloads (See Note 3), but not less than 40,000 lb., from Ritchie, Ill., to Peoria, Ill. Rates in cents per net ton. Present, 130c; proposed, 115c.

# Foreign Abstracts and Patent Review

**Alumina Cement-Artificial Cement Mixtures.** Introduction of artificial cement into alumina cement greatly accelerates the set of the latter. The alumina cement employed, in normal mix, starts to set at 4 hr. 25 min.; mixed to a very plastic paste with 27% water, its set starts in 6 hr. The artificial cement employed starts to set after 4 hr. if made plastic with 27% water.

Additions up to 30% of artificial cement to the alumina cement did not change the set of the latter appreciably. After passing the 30% mark, the mixture started to set after 5 to 7 min. The results of mixing in this manner were not satisfactory. When up to 40% of alumina cement was added to an artificial cement; the mixture started to set after 20 min., after which hardening was rapid with release of heat, terminating in 15 min. The tensile strength of the plastic mortar (1:3) is as follows:

Storage	Artificial cement without addition	Artificial cement with 40% of alumina cement
2 days	14.8 kg.	14.2 kg.
7 days	23.7 kg.	17.5 kg.

—Ciment (1929), 34, 12, p. 641-2.

## Aggregate Production in Germany.

Schaechterle states that a completely uniform composition of concrete can be obtained at the building site only when the individual constituents, namely, sand, fine gravel, gravel, crushed stone, are delivered and stored separately and then combined in each mix exactly in the prescribed proportion. According to Graf, the cement-sand grading should be:

Sieve (American)	Per cent. passing
4-mesh	100
9-mesh	65
25-mesh	35
100-mesh	25

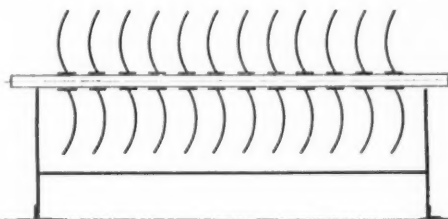
The strengths of the concrete are greatest when there is just enough sand in relation to the crushed stone to fill the voids between the stones.

In Germany the efforts towards a standardization of sand, crushed stone, gravel, etc., have thus far not led to the desired results because the producers of aggregates are not sufficiently interested in conditioning the various aggregates; for they supply not merely aggregates for concrete purposes but also large quantities of materials for ballast and similar uses on roads and railways.

Because of the unfavorable experiences obtained with aggregates which were delivered unsuitably mixed and unclean, and with cements which were delivered in unsatisfactory condition, the director of the Governmental Railway at Stuttgart, Germany, was forced to obtain the cement for railway uses from a central distributing place and to produce suitable aggregates, namely, sand, gravel, fine gravel and crushed

stone, in railway-operated plants.

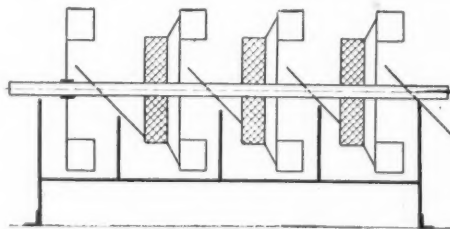
The governmental railway has therefore erected aggregate preparing and conditioning plants at favorably located sites. In 1925, for example, a grading and washing plant was built near Leutkirch, at Marstetten. In order to predetermine the best operating conditions for the plant, samples of the gravel sand were taken at various spots in the pit. The average constituent of particles which are removable by washing was found to be 6%. A sieve analysis showed the presence of too much fine sand of 100- to 25-mesh size. Furthermore, test specimens of different mixes were prepared with both washed and unwashed gravel sand;



Drum provided with "swords" used for pre-washing gravel

these showed that the loamy and clayey admixtures in the natural deposit are detrimental not only because they prevent cementing, but also because they require more makeup water. The sand was washed and the grading improved, with resulting increases of strength of 30 to 40% as compared to washed, ungraded sand and gravel as it came from the deposit, and of 100 to 150% as compared to the unwashed excavated mixtures of sand and gravel.

A significant improvement was made by cleaning the material, by separating sand and gravel, by classifying the gravel into



Washing and screening rotating drums

sizes ranging from 3/16- to 1 3/4-in., by eliminating the excess of fine granules in the sand and by the addition of the necessary larger sizes of gravel.

The gravel plant at Marstetten was equipped with a mixing and grading plant in connection with bins from which the railway cars are loaded. The material which comes from the gravel pit is pre-washed in a drum provided with "swords." Then it passes through a washing and screening

plant having several rotating screening drums; during this operation the material is classified into three grades of 0- to 4-mesh, 4-mesh to 1-in., 1-in. to 2 1/4-in. The oversize is reduced in a crusher and screened to various sizes. The washing machines were supplied by the Excelsior Maschinenbau-Gesellschaft, Stuttgart, which company furnished the entire equipment. The wash water is taken from a ground water basin loaded in the gravel pit and is delivered to the elevated washing plant by means of a high pressure circulating pump. The silt of the effluent water from the washing plant is settled in large silt basins. By regulating the quantity of water for washing, an improvement in the sand grading is also effected, for a portion of the superfluous sand fines is also washed away. However, there remains an excess of fines in the sand, hence a greater amount of 3/16-in. sand is added and this is obtained from the fines of the crushed gravel operation. Sizes delivered are: sand, 0- to 4-mesh; fine gravel, 1/4- to 1-in., and coarse gravel, 1-in. to 1 3/4-in. A special fine gravel, 1/4-in. to 9/16-in., is sold for use in artificial stones, concrete products, etc.

The costs for washing, screening and mixing of the aggregate is between 12 and 15 cents per cubic yard. Uniform and good concrete is assured by use of the aggregates prepared in this manner.

## COSTS OF PREPARING AGGREGATES AT THE MARSTETTEN, GERMANY, PLANT

Invested capital:	
Plant site and deposits	\$ 9,000.00
Buildings	5,000.00
Equipment	12,000.00
Hauling and switching tracks	2,100.00
Total	\$28,100.00
Interest and amortization:	
On total investment at 8% annually	\$ 2,248.00
Amortization:	
Plant site and deposits at 3%	270.00
Buildings at 8%	400.00
Equipment at 15%	1,800.00
Track at 8%	182.00
Total	\$ 4,900.00
Production costs (based on annual production of 52,300 cu. yd.):	
Interest and amortization, per yd.	\$ 0.093
Labor, washing plant, per yd.	0.015
Production costs:	
Excavation, per yd.	\$ 0.20
Stripping, per yd.	0.01
Washing-pond maintenance, per yd.	0.01
Supervision, per yd.	0.01
Safety work, vacations, etc., per yd.	0.01
Power consumption, per yd.	0.02
Maintenance, buildings	0.04
Maintenance, equipment, sales, tax	0.01
Miscellaneous	0.06
Total, per yd.	\$ 0.478

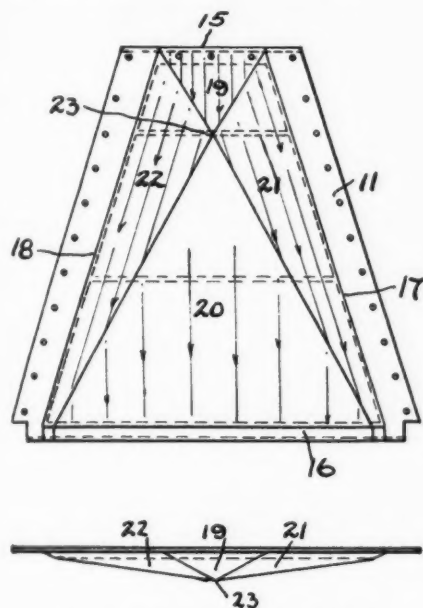
—Beton u. Eisen (1929), 17, 313.

**Eliminating Dust Nuisance in Cement Plants.** Schirm describes the various methods employed in eliminating dust in cement plants, particularly rotary kiln operations. He points out the advantages and disadvantages of each method which he describes.—Gesundheits Ingenieur (1930) 53, 8.

## Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C., and the British Patent Office, 25 Southampton Bldg., London, Eng.

**Distributing Feed to a Screen.** The device is a feed plate and it is shown in another cut than that reproduced here as attached to a screen of the electrically vibrated



Feed plate of unusual design

type. This plate is set at such an angle that the feed, sand, for example, flows over it by gravity. The upper surface of the feed plate is made of four pieces which are arranged to form a flattish, trapezoidal pyramid. As the sand flows over them it is spread out in the way shown by the arrows so that it flows over the lower end as a sheet of substantially even thickness.—F. P. Nickerson, U. S. No. 1,737,383.

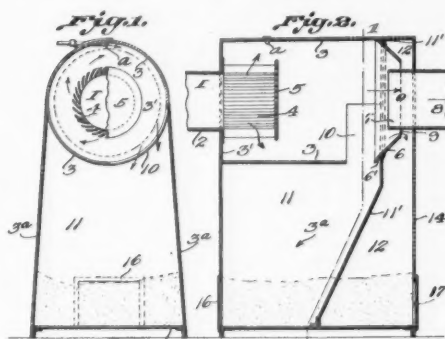
**Solidifying and Waterproofing Permeable Siliceous Masses and Masonry.** Loose and permeable sandy masses, as friable rock or masonry structures, materials, etc., are treated with suitable chemical solutions as silicic acid or soluble silicates and acid or salt solution, to react in such a way that a silici gel is formed which consolidates the loose masses. The method can be used to treat natural soils, banked-up material or in sinking shafts, foundations, strengthening dams, and for preserving parts of buildings. In consolidating soil, the solutions are poured, sprayed or injected at suitable depths. Buildings are treated by applying the solutions one or more times successively to the surface. If the walls are thick, the solutions are injected through boreholes.

In the treatment of masonry materials, blocks and likewise, the preferred method is by immersion in the solution, in a closed vessel under pressure. Dry materials are given a preliminary treatment with water or soap solutions. Impregnated materials may be waterproofed by a finishing treatment comprising applications of organic

salts and acids such as calcium oleate, stearate, etc., or soluble inorganic materials which produce insoluble matter on reaction.—British Patent No. 322,182.

**Non-Absorbent Sand-Lime Brick.** The usual process of making sand-lime brick is employed with modifications, viz., into the hardening cylinder, just at the end of the steaming process, an impregnating solution is injected. The solution used is a 2 to 3% concentration of sodium stearate or alkali salt of like fatty acid. After immersion for 10 to 20 minutes, the solution is drawn off, the cylinders opened and the cars of brick removed.—H. W. Charlton, U. S. No. 1,745,601.

**Dust Collector.** The device shown is made in two forms but only the simpler, horizontal, form is shown here. The dust laden air enters through a tube and passes through vanes that give it a whirling motion. The dust is thrown outwardly to the walls and works to a pocket below. The final separation is made by a flat cone surrounding the outlet pipe. There is a narrow annular space between the cone and the out-



Dust collector

let pipe through which the dusty air circulates, the dust settling in the pocket and the air returning to pass out by the outlet pipe. C. G. Hawley, U. S. No. 1,715,549.

**Lightweight Aggregate.** The process relates to the production of a sulphur-free cellular aggregate suitable for concrete floor filler, roadbed ballast and concrete construction. This is accomplished by spreading the slightly moistened ash product of burned fuel mixed with some unconsumed carbon in a uniform thin layer in depths slightly more than the thickness of the cake desired on a pervious support. The moistening may be omitted if the material is in proper condition. The surface of the layer is ignited and the combustion permitted to pass through the layer to the opposite surface. Sulfur in the ashes is oxidized and carried away by the gases and when combustion is completed, the layer is converted to a thin-walled, honey-combed mass, light in weight but rigid and strong.

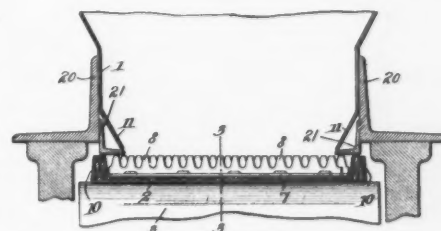
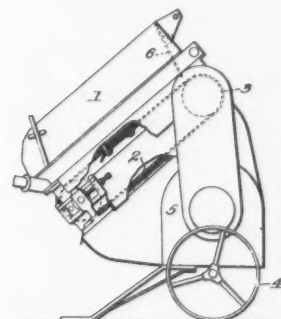
In some cases, the ashes have sufficient unconsumed carbon to carry out the combustion, hence materials such as sands, crushed rock, clay, etc., may be added and the whole treated as above. Fluxing materials such as

limestone dust, fine iron-bearing compounds, can be added to reduce the melting point temperature of the mix. The process is applicable to natural materials as carboniferous shales.—R. L. Lloyd (assignor to Dwight and Lloyd Metallurgical Co., New York), U. S. Patent No. 1,746,860.

**Applying Wallboard.** To the nailing edges of wallboard, "U" shaped metal clips or channels are applied so as to strengthen the board at nailing points. The nails are driven into the studding at points exterior to but adjacent to the clips.—C. O. Walper (assignor to U. S. Gypsum Co., Chicago), U. S. No. 1,727,420.

**Alkali Phosphates from Rock Phosphate.** An improved process of digesting rock which comprises the introduction of a charge of the rock into a liquor resulting from the washing of the sludge from a previous digestion. The sulphuric acid and nitre cake are then added and the temperature of the liquor controlled to keep it below 150 deg. F. throughout the digestion period.—W. H. Lohmann, U. S. No. 1,747,588.

**Cleaning and Blending Sand.** A method which is especially adapted to cleaning molding sand, but which might perhaps be used for removing chips and like trash from other sand, employs a fast running conveyor belt. On the surface of the belt are fastened pieces of serrated metal, the points forming what are called sprigs. These are set so that the spaces on one are behind the points of the next. As they pass under a feed hopper the sprigs draw out sand. Any impuri-



Device for cleaning sand

ties like nails and bits of metal are held above and are removed by flexible fingers, shown by dotted lines in the cut. When the device is used to clean molding sand new sand may be added. It is claimed that the speed of the belt throws the sand far in front of the discharge, thus loosening it and aerating it and preparing it for use in molding.—G. F. Royer, U. S. No. 1,736,054.

# Mill Safety Is Theme at Kansas City

Cement Section of Central States Safety Congress  
Attracts Representatives of All Local Cement Mills

**S**AFETY in the cement mills and quarries of the Midwest received another big boost at the meeting of the Cement Section, in connection with the Central States Safety Congress in Kansas City, March 25.

Over 100 of the leading operating men were present from the Chanute (Kan.) and Louisville (Neb.) plants of the Ash Grove Lime and Portland Cement Co.; the Fredonia and Mildred (Kan.) plants of the Consolidated Cement Corp.; Dewey (Okla.) plant of the Dewey Portland Cement Co.; Iola (Kan.) plant of the Lehigh Portland Cement Co.; Bonner Springs (Kan.) plant of the Lone Star Cement Co.; Independence (Mo.) plant of the Missouri Portland Cement Co.; Humboldt (Kan.) plant of the Monarch Cement Co.; and the Hannibal (Mo.) and Independence (Kan.) plants of the Universal Atlas Cement Co. R. M. Johnson, district superintendent of the Consolidated Cement Corp., acted as general chairman.

The program was as follows:

## MORNING SESSION

- "Safety in Industry"—Dr. F. V. Meriwether, U. S. Bureau of Mines, Picher, Okla.
- "Powdered Coal"—J. G. Stadler, Lehigh Portland Cement Co., Iola, Kan.
- "Responsibilities of Foremen from the Angle of Foremen's Opportunities"—Guy Gardner, Ash Grove Lime and Portland Cement Co., Chanute, Kan.
- "Packing and Loading"—R. A. Loveland, Dewey Portland Cement Co., Dewey, Okla.
- "Machine Shop"—J. J. Adams, Consolidated Cement Corp., Mildred, Kan.
- "Quarry"—C. P. Mitchell, Monarch Cement Co., Humboldt, Kan.

## LUNCHEON

Chairman: Vincent Newcomer, superintendent, Missouri Portland Cement Co., Independence, Mo.  
Speaker: Sergt. V. C. Dobson, Kansas City Police Department.

## AFTERNOON SESSION

- "Electrical Hazards"—George Burgess, Missouri Portland Cement Co., Sugar Creek, Mo.
  - "Housekeeping"—L. J. Wheeler, Lone Star Cement Co., Bonner Springs, Kan.
  - "Yards"—A. K. Frolich, Ash Grove Lime and Portland Cement Co., Louisville, Neb.
  - "Waste Heat"—C. M. Carman, Universal Atlas Cement Co., Atlas Division, Independence, Kan.
  - "June No Accident Month, Its Advisability"—T. F. McClaren, Consolidated Cement Corp., Fredonia, Kan.
  - "Work of the Portland Cement Association"—E. R. Rogers, Portland Cement Association, Kansas City, Mo.
- First-aid contest under the direction of the U. S. Bureau of Mines.

## DINNER

With other sections of Central States Safety Congress at 6:30 p.m.

## Packing and Loading Accidents

Regarding the reduction of accidents in packing and loading departments, R. A. Loveland, packing house foreman for the Dewey Portland Cement Co. at Dewey, Okla., said in part:

"Everyone knows that if a man is fatigued his mental alertness is reduced and his reactions to outside stimulus is slowed down. In the packing room the work is the hardest in the cement plant and is done in a hot dusty place. Taking chances is a human tendency. A man will take a chance to bring an unpleasant job to an early close. In most plants the packing is piece work, and some cars of cement must be loaded ten sacks high. They have their choice of handling ten sacks at a time on the truck, or handling a fewer number and piling them in the car. In practically every case they choose to handle ten sacks on the truck, which is more than any normal man should try to handle.

"Now, along what lines shall we work to reduce accident frequency? I think of three general principles: More safety education; better management; better design, and guards.

"Safety education has been exercised more than any other safety field, but the limit

has not been reached. However, we must remember that intelligence and experience are not as high in the packing room as in other departments, such as electrical or repair, and therefore, for a given educational effort, we will get poorer results; which means with a given hazard the pack-house crew will have a greater accident frequency.

"The management should work out a safe routine and see that it is rigidly followed. For example, a cement plant has a switch engine to handle the loads below the pack house. A rush order comes just before the railroad company switching. The plant switch engine is not to be found and the track below the pack house is full of loads. Perhaps the only way he can load these cars before the railroad company's switching is to bump down the loads with the empties. He does and he gets away with it this time; and the emergency arises later and he does it again, and some day the new man is knocked off the top of the car by the jar.

"Better design is a sort of hobby of mine; starting with the screw conveyor. Since May, 1927, the pack-house department and cement-storage department have had over 60% of their fatal accidents with screw conveyors, and total accidents higher than from any other cause. My experience with screw conveyors has led me to think that they are a very hazardous piece of machinery. It is fortunate that we may replace screw conveyors with Fuller-Kinyon pumps and belt conveyors, as well as other types of equipment. Very safe installations may be made in this way. In fact, so safe that a fatal accident due to them would be almost impossible. And, in addition, the dust which adds very greatly to any hazard may be much more easily controlled. There are other ways in which good design can make a packing department safer. If a bin is so designed that the last 2000 bbl. of cement in it must be shoveled out, then it is an unsafe design. And, if the screw conveyor gallery is narrow and low, and in addition, improperly drained so that it sometimes contains several inches of water, then the men will most certainly walk on the conveyors, from the superintendent down.

"Guards for machinery are fine, but if a guard is off where men are in the habit of finding one, then you have a hazard sure enough. It is better to make a guard part of the machine; that is, so that the machine will not operate without the guard on it.

"To reduce our accidents we need more safety education, better management, better design and effective guards."



R. A. Loveland, Dewey Portland Cement Co.

# Explosion Hazards From the Use of Pulverized Coal in Cement Plants

By J. G. Stadler

MANY explosions and fires in powdered coal plants probably can be traced directly or indirectly at least to overheated coal. This condition introduces into the coal stream coal that is ignited or soon becomes ignited spontaneously and thereby spreads smouldering fire all through the system. Under these circumstances so common a thing as screening a mill can be hazardous.

Over-heated coal and fires in the dryer drum are mainly caused by too hot fire in the dryer furnace or the continuance of the dryer furnace fire after the dryer drum has been shut down but still contains a charge of coal. In operating a dryer it is well to remember that a large volume of warm air at a moderate temperature has a greater drying capacity than a smaller volume of air at much higher temperature. If this can be gotten over to the dryer operator, he will have less tendency to force the dryer beyond its capacity.

Dried or pulverized bituminous coal tends to absorb oxygen rapidly and thereby to reach a stage of combustion. The critical point at which oxidation begins to increase seems to be about 150 deg. F. From that point the temperature rapidly increases to the ignition point. Storage bins, in order to prevent liability to spontaneous combustion, should be tightly covered and all manholes or openings made air-tight. It is, however, well to provide a vent pipe to outside air to relieve any pressure that might build up.

Coal of partial size retained on the 20-mesh is said not to enter into the propagation of an explosion. So we might say then, that any coal which passes the 20-mesh sieve can be considered explosive.

Pulverized coal in bulk is not explosive. It becomes dangerous only when stirred up or disturbed so as to form a cloud with the proper proportion of air. To produce a serious explosion, such a cloud of coal dust needs only contact with an open flame or some heated body having a temperature high enough to ignite it.

It would seem that to eliminate coal dust clouds, or atmospheres heavily laden with coal dust, should be our first step in preventing explosions, and our second to keep open flames away when they do exist.

## Importance of Good Housekeeping

This means good housekeeping in its fullest sense because a small primary explosion will then be unable to propagate a major explosion. The dryer room, mill room and kiln room must be kept clean and free from accumulations of coal dust on roof trusses, beams, window ledges and other overhead appurtenances as well as all floors, walkways and steps.



J. G. Stadler, Lehigh Portland Cement Co., Iola, Kan.

At times, all of us are required to do some blasting on the mill site in the course of construction work which as well as heavy quarry blasts, will usually, if housekeeping is not the best, cause a veritable shower of coal dust in the kiln room, coal grinding and drying departments. In cleaning, do not use compressed air, as it creates clouds that are distinctly dangerous. There is also an economic aspect to good housekeeping. It has been estimated that, in some plants, as high as 2½% of the coal handled is lost as dust. Of course we have no plants in our district which are as negligent as that, but it does show that when we keep our coal plant clean and safe we are also making a saving.

Dust clouds can result from many other conditions, some of which are beyond our control, such as conveyor and elevator breaks, coal feed troubles of various kinds, necessary cleaning of coal tanks, etc. However, leaks in elevator housings, loose fitting conveyor covers and other leaks of this type are under our control and can be prevented. Coal clouds are to be considered a menace and one should be ever on the alert to prevent them.

The dryer tender, the coal grinder and the burner, in fact all connected with the actual handling of coal in its various stages, should be taught so as to become thoroughly acquainted with the potential explosibility of

the material with which they work. I believe we should build up a respect for pulverized coal equal to our respect for natural gas, which has long since been recognized as a deadly menace when uncontrolled. An atmosphere heavily laden with coal dust, like the odor of escaping gas, should be a danger signal and steps taken immediately to eliminate it as well as to keep open flames away from it.

I have an accident in mind that seems to show the disrespect we have for powdered coal. A small pile of such coal lying on the kiln-floor developed a blaze, and a workman near by started to stamp it out with his feet. This created a cloud of coal dust around him which ignited from the burning coal under his feet, burning him so severely that he died. The man evidently had a safety thought in mind when he started to put out the little blaze, but he had not the proper respect or he would have not used his feet for a fire extinguisher.

## Starting Up a Kiln

Peculiar to our industry is the liability of explosions within the kiln. These usually occur when starting a cold kiln or one that has been down for a short period incidental to a repair of some kind. In starting a cold kiln, first, be sure the air pipe is free of unsuspected coal by turning on air slowly; also, observe the kiln for unsuspected coal that might have gotten into the kiln when trying out coal feed machinery without the knowledge of the operator. In other words, be sure you are not going to get coal until you turn on your coal feeder. Prepare a good torch by securely wiring 1½ to 2 lb. of cotton waste to the end of a grate hook. Saturate this with red oil or other oil of that nature. When lighted and projected into the kiln, such a torch makes a good blaze to fire against until the kiln gets hot enough to support continued combustion. Good dry kindling wood can also be used but should be well lighted before being put into the kiln. If the kiln has been down only a short time, it is essential that the kiln be turned so as to expose red hot clinker before turning on the fuel. Failure to do this has caused several serious explosions. When a kiln has been shut down to work on its coal feeding devices, it is also important to see that no coal gets into the kiln in the course of the repair work. Turning the kiln preparatory to starting up will expose red hot clinker which ignites any coal in kiln and the intensity of the resulting explosion is only dependent on the amount of coal that has gotten into the kiln.

Serious accidents of this kind are on record. In starting a kiln, generally the operator is inclined to use too much air which is liable to partly extinguish the torch or kindling temporarily and allow unburned coal to be projected into the kiln and when kindling or torch flares up, an explosion results from excess coal. Our production starts and stops with our kilns; and when-

ever they are down, in the vernacular of the kiln room, we are all anxious to get the kilns rolling again, but I believe we should temper this feeling with the thought of making haste more carefully.

In closing, let me say to you that the two essentials in preventing coal-dust explosions

are a thorough knowledge of the potential explosibility of coal dust and good house-keeping. To this end I recommend the study of United States Department of Commerce, Bureau of Mines Bulletin No. 242, on this subject, as a source of much valuable and enlightening information.

## Responsibility of the Foreman From the Angle of the Foreman's Opportunity

By Guy Gardner

**I**N order that we should be able to understand more completely the title of this paper, we looked up the definition of the word "responsibility," and find that it is defined as follows: First, answerable legally or morally for the discharge of a duty, trust or debt; second, having capacity to perceive the distinction of right and wrong; third, able to meet obligations; fourth, involving accountability or obligation.

In taking up the matter of responsibility of foremen in direct charge of men, there is a matter that takes precedence, and that is the supervision of such foremen or supervisors by other supervisors higher up. This supervision must determine whether subordinates are earnestly interested in every policy, including safety, sponsored by the management, because enthusiasm and support of any company policy will never boil up from the bottom—it must percolate down from the top.

Then, a foreman with a thorough understanding of the company's policies and interested and ambitious to further such interests at all times, will assume every responsibility in planning his work, teaching his men and taking care of other activities in line with his job.

### Foreman a Leader

Foremen are not all naturally equipped to lead and teach men, but they can be helped by inclination and study, in order that they can carefully analyze each individual in their charge and be able to judge whether such material will fit in and help build up their organization.

A foreman must himself be ambitious, and the traits of loyalty and faithfulness will grow with his responsibilities. He will then be in better shape to reach his men, to win their confidence and respect and naturally the process of training is well begun. The workman becomes interested and wants to learn (and most men really want to learn), and the foreman, instead of having just a responsibility, really has an opportunity to help others get bigger and better jobs, and thus aid himself, the man and industry.

The policy of a foreman in dealing with his men should be one of fairness in mind

and practice, and he should be as free to commend his men as he is to criticize them. Such criticisms, when made, should be given constructively. A foreman who has a human appreciation of effort, and who earnestly tries to treat his men as he would have his boss treat him, is the foreman who is fostering contentment and satisfaction, for both the safety of the worker and the quality of his work.

The foreman represents the company to the men, and it is his duty and privilege to become conversant with its ideals and policies, and to pass on to the men such information as will maintain or improve the organization.

He plans his work beforehand—he places his men to the best advantage, he is ever studying the individual in order to be able to keep the ranks filled in an emergency—for unpreparedness or hasty assignments have been the cause of many accidents.

As a foreman is a representative of the company to the men, he is likewise a representative of the men to the company. He considers and takes care of their inquiries or submits them with his recommendations to the management.

The foreman's habits, ability and knowledge of the work should command the respect of his men. Patience should be a quality as sometimes his efforts may appear for the time as not appreciated. In case of an accident the defense is usually offered that the man was told not to continue an unsafe practice—told several times. Such a case shows a lack of understanding between foreman and man. He has given an order and required no fulfillment.

### Foreman a Specialist

We must assume that a foreman in any organization has been trained for a particular line of work and knows from experience what his department is expected to do as its part of the production of cement. The foreman, therefore, need not receive his orders, whether written or verbal, from his superior except in particular instances. Under ordinary conditions he already knows what is expected of him and has been selected for this place because of his ability in his line of work, his capability in handling men, and his willingness to accept responsibilities, all of which are the important qualifications of a foreman. He has been chosen by the superintendent, either from observation as a capable workman, or upon recommendation of someone else; he has probably been tried out as being able to handle men as a subforeman and has been tested as to his willingness to accept responsibility.

A foreman can readily realize his responsibility to his superior as long as it deals with output or an obligation with which he is acquainted. He is usually a better paid man than his best mechanic, even though he may not be a better workman, but he is able to assume responsibility and is paid in part for this quality.

Some foremen seem unwilling to accept this responsibility, when we turn from production to the safety and well-being of their men.

Blame is that which is deserving of censure or to find fault with. We usually hear in case of an accident that so-and-so was to blame; the foreman will contend that the workman had been told what should have been done or what should not have been done.

If the foreman's order is given in such a way that it is not clear to the workman and the result is an accident, that preponderance of blame rests on the foreman instead of on the workman who started the job without clearly understanding his instructions.

### Fixing Responsibility for Accidents

With these comparisons before us of 877 lost-time accidents and 33 fatal accidents in 1928, and 820 lost-time accidents and 38 fatal



Guy O. Gardner, Ash Grove Lime and Portland Cement Co.

accidents in 1929, it would appear that the response to safety programs is not what it should be. How many mills represented here today have gone through the experience of the Ash Grove mills, that of safety contests, mass meetings, safety rallies and similar activities, only to experience a very unsatisfactory 1929 record in accident prevention.

Where can the responsibility for these accidents be fixed?

We have often heard the statement made that 75 to 90% of industrial accidents are the fault of the men themselves. It may be true that even so large a proportion of the industry's casualties could have been prevented by things which the men might have done, but did not do, but it is equally true that a very large number of the same accidents could have been prevented by some things which the foremen could have done and did not do.

Statistics show that one lost-time accident is preceded by 28 reportable accidents, and 300 which do not result in actual injury. An employee who is injured as a result of an accident has, in the average case, made the same mistake, the same error of judgment, violated the same instructions, or taken the same chance that finally caused the injury, many times before without, however, having been hurt.

In how many cases can mills represented here attribute the cause of their accidents to improper safeguards? This question brings to the attention of the industry the vital fact that if unsafe practices are controlled, our accidents will be controlled.

#### **Here Lies the Opportunity of a Foreman**

If responsibility for accidents is fixed, the management is as responsible for an accident as the foreman, as the foreman is the direct agent of the management. If accidents continue under a foreman, the management is as responsible as the foreman for their continuance.

The foreman, the keyman of industry, should be carefully selected, be held responsible for accidents in his department, and be backed up by the management to the fullest extent in the enforcement of safety rules.

We realize that fixing this responsibility on the foreman is not a cure-all, and that the continuation of employee's safety education is essential. Safeguarding of machinery must go on; but we believe that when the management and the foremen come to recognize their common responsibility in accident prevention, the seriousness of our accidents will decrease.

In conclusion I am sure we all agree with the writer who says: "There is no such thing as National Initiative. All progress begins with a few individuals. There is no mass brain. There is only mass memory."

"In the evolution of the human race upwards, all progress depends upon the production of a comparatively small number of improved individuals, and who, by reason of their superior powers, render new service."

## **Avoiding Machine Shop Accidents**

By J. J. Adams

THE machine shop in most mills is exclusively a maintenance factor. It must be in readiness at all times to cure the afflictions of all other departments, regardless of their size or nature. In most cases the shop equipment is not of the most modern design, and not provided with the necessary attachments required to perform many tasks which it is called upon to do. Therefore, in making spe-

press work, which is more or less hazardous to the safety of the organization. The drill press is one of the most dangerous tools in the shop if the work is not properly secured. Therefore, it should be equipped with a good substantial vise and various clamps for securing the objects that are to be drilled.

The emery wheel is an innocent looking shop tool, but it is ready to relieve you of a finger at any time. Even an entire hand has been ground off so quickly that there was no chance to render any assistance to the victim. Due to the fact that almost every man in the organization of most factories has occasion to make use of the emery wheel, it is very important that it be properly equipped with safeguards and that the rests are properly adjusted at all times. As speed is not the vital factor in the average shop, it is better to influence the men to be careful and see that everything is secure than to try to get by in a careless way. If a man is of the right kind, he will not take offense to being told he is taking a chance, but will accept it as a favor. The foreman should remind his organization frequently that safety is the first thought in performing any duty. Criticize carelessness but do not unjustly "bawl men out." Prohibit the playing of pranks, but do not prohibit occasional bright conversation.

Do not make the shop unwelcome to workmen of other departments. Let them feel that they can go to you and at least get a pleasant interview. The best safety medicine is contentment and harmony of the entire organization.

Unless a man can listen to instructions or corrections from the foreman, he is without doubt a liability. He may be an excellent machinist, conscientious worker and valuable in many ways, but that one fault offsets his value to his employer. The delays caused by lack of attention to instructions may prove very costly not only in immediate production but more so in the future. The foreman as a rule must be his own inspector and check the work of all his workmen and at the same time must master all of the difficult problems coming into the shop. And a careless workman is continually causing uncalled for delays and loss of valuable time not only in the shop but in other departments.

The "Safety First" slogan should be the word of fellowship to all the workmen in the shop and the entire organization and all rules should be founded upon safety teaching, and not on irritating, hard commanding and compulsory wordings. Of course, rules pertaining to time clock, routine, safety and drawing out of tools, which are necessary in every shop, should be printed and posted in a conspicuous place. I have found the new man will pattern his ways and habits after



**J. J. Adams, Consolidated Cement Corp., Fredonia, Kan.**

cial set-ups, all or a greater part of the safeguards on the machines frequently have to be removed and left off until the work is completed. In a great many cases the machines used in the shop were built before any thought was given to the safety of the men who operated them. And the safeguards are in most cases of home-made construction and are very inconvenient to remove and replace, and sometimes after removal must be rebuilt before they can be replaced. This being the case, the men may easily become careless about replacing guards, and in a good many instances would throw them away and take a chance rather than be annoyed by some unsightly and poorly constructed guard. Every shop foreman should call the attention of his superiors to this fact and get them to co-operate with him in designing more safeguards that could be readily removed and not be a sore eye to the machine on which it was placed.

It is a practice in a great many factories to allow the men from other departments to come into the shop and do their own drill

those of the other employes, and after the condition of the shop in general. If the shop and equipment are dirty and the men are permitted to let wastes or broken parts lay strewn over the place and never pick up anything after the job is finished, the man

will soon fall into careless habits. If the shop is tidy and the men taught to clean up accumulations of discarded parts when finished, the new man will be quick to absorb and follow in the footsteps of the other employes, taking pride in a clean shop.

## Electrical Hazards

By G. W. Burgess

**N**O DOUBT all of you are conversant with power installations, whether you manufacture your own, or if it is brought to you over high tension lines. You all know the danger of high tension lines, how necessary it is to keep your insulators and contacts clean, also the protection it is necessary to give these lines and transformers from the prying public. The danger caused by leaky or dirty insulators is very great and might cause great inconvenience at your plant, but do you know or realize the danger of putting men to work on this stuff who have not received the proper training?

The number of accidents caused by electricity are very numerous but I feel sure that if utmost caution is used, a great number of them can be eliminated.

Did any one of you ever take a boy off a switchboard who was held there by the juice, he having come in contact with an open switch while dusting off a panel? *Cause*, ring on finger.

Did you ever take a boy out from behind a switchboard who was held there by the juice, when the smell of burning flesh was a stench to the nostrils? *Cause*, stumbled while sweeping up and fell against buss bar.

Did you ever apply resuscitation to a boy who had been knocked cold? *Cause*, screw driver crossing contacts.

Did you ever come to in a bed and hear a voice saying, "A very bad burn, keep the room in total darkness and watch the eyes closely."

Talk about your thrills, boys, those are the times when you get them. And think, each one of these accidents could have been avoided.

The accidents that have occurred by electricity are very varied in nature as the following will show:

Repairman crawling out of boiler through manhole came in contact with electric fan wire and was electrocuted.

Electrical trouble man received severe burns about face and body when short occurred while hooking up concrete mixer switch.

Electrician installing clamp without cutting off power when his hand came in contact with jaw of hot switch. He received 440 volts without burn.

Electrician inspecting raw mill oil switch neglected to pull disconnects and switch before going into switch cage to inspect. He was burned on face and eyes and both hands.

While attempting to insulate exposed nut on 6600-volt pothead, worker's hand accidentally came in contact with pothead terminal and either grounded or short circuited

it, current passing through body causing instant death.

Shale quarry foreman operating shovel in heavy rainstorm, came in contact with wet controller when throwing lever and suffered shock from 440 volts from which he died.

Again we find the great uncertainties of life exemplified in their true colors. It is a fact that no one can avoid all chances. In our brief moments of relaxation we take chances when boating or swimming, playing football or baseball, but in these the risks can be brought to a minimum by avoiding unnecessary risks and the benefits are usually worth while.

There are enough unavoidable hazards in life to make it interesting without tempting fate by defying all the written and unwritten rules of safety and common sense. And while we are building up our reserve by careful relaxation we must not overlook the fact that we owe something to our fellowmen, for there is nothing under God's Heaven that justifies your creation or your citizenship but this gospel, that the next greatest thing to creating a life is to save a life, and the greatest single factor is the prevention of preventable accidents.



G. W. Burgess, Missouri Portland Cement Co.

### Electrician's Creed

In my opinion the electrician's creed should be:

I will never go to work on a compensator or switch until I am positive that the juice is off.

I will never start a machine until the operator of same has requested it, and then only after personal investigation.

I will never work on hot stuff unless my tools are all properly insulated.

I will always use whatever tool is in general use at the plant to open a knife switch, but never my bare hands.

I will never throw the juice on the board of any department until I have received a request to do so from the operator of said department.

I will always stand to one side of starter when starting or stopping motor so as to enable me to be out of the path of an arc, should one occur.

### Properly Designed Electrical Equipment

Due to the heavy machinery required in our industry, the electrical equipment must be powerful. A large amount of current must be handled during periods of starting some of these mills. This heavy current used in starting puts considerable strain on the starting device, wiring and motor. Therefore, this starting device and motor should be liberally designed to stand this service and wiring should be installed of ample capacity to take care of these conditions.

A great many accidents have occurred due to starting compensators blowing up, especially the manually operated types. These blow-outs are usually due to loose connections, contacts in bad order, dirty switch oil or faulty method of handling by operator.

Frequent inspection and renewal of contacts are necessary, connections gone over and tightened and oil changed. Compensator cases should be permanently grounded.

Teach your men when starting large motors to throw the lever in quickly and with plenty of force, so as to insure a good contact being made before a dangerous arc is started. This same rule applies when stopping motor. Disconnect switches should be placed in line ahead of all starting equipment so current may be cut off during repairs. This switch should also be used when men are working on a mill to protect them against the possibility of anyone through ignorance trying to start the unit on which men are working. Repair work should never be attempted on line circuits if it can be avoided. If it is necessary that this work be done with the circuit alive, extreme care should be taken in insulating the body, such as providing heavy rubber gloves and a dry insulated platform to stand on while the live parts are being handled. Never put a man who is inclined to be reckless or a chance-taker or a green man on these hot jobs.

# Yard Hazards

By A. K. Frolich

**T**HE YARD is probably one of the most dangerous departments. This is partly due to the large number of railroad tracks that are necessary to economically carry on manufacturing and shipping activities. All cement plants have tracks running through their yards, and it is only human nature to consider these tracks as a substitute for sidewalks, although walks are usually provided in convenient locations. When the latter is not the case, it would be a good policy to provide walks in the most practical locations in order to lessen the temptation to consider tracks as walkways. In addition to this, walks should be properly maintained the year round and kept free from all ice and snow—this will make them more attractive for use.

Experience has proved that the safety sign is a very valuable asset, especially in the yards where dangerous operations exist. A warning sign can be properly placed in alleys running between buildings that open on to railroad tracks. Recently, it happened that I passed through an alley way of this kind and found a track gang using the warning sign as a clothes rack for their coats.

When cars, whether empty or loaded, are spotted on elevated tracks, caution should be exercised to make sure that the brakes are set securely, and the wheels blocked. It is not good practice to depend on the railroad crews to do this.

At the Louisville plant, we use two men in letting railroad cars down an incline by gravity; one man being on top of the car near the brake, and the other alongside ready to block the wheels. The man on the side carries a whistle and is required to blow it at every alley way. The men are also requested not to allow the moving car to bump against other cars located on the tracks unless it positively cannot be avoided.

An accident which happened at our plant will serve to illustrate this point:

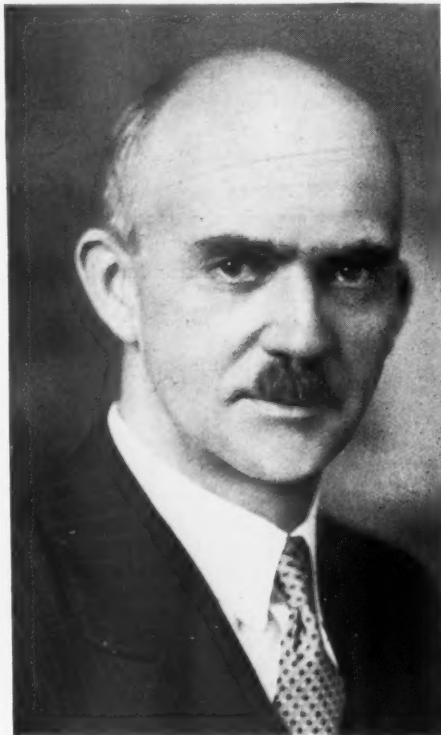
A railroad car with defective brakes being dropped down a slight incline, was allowed to hit an empty car which was, at the time, being cleaned out for loading. The car cleaner was, of course, knocked down and the accident could have resulted in a very serious injury.

It is very essential that every plant have a definite understanding with the railroad companies that they shall not make flying switches inside the plant yards.

## Railroad Cars Poor Shelter

One of the most foolish cases I ever heard of was related in a safety talk at one of our recent mass meetings. This

incident concerned three men who were working on the outskirts of a plant when it began to rain. They first visited a neighbor's watermelon patch, then took shelter under a nearby railroad car, which happened to be the last car of a long train. They were so busily engaged in devouring the watermelons, they did not



A. K. Frolich, Ash Grove Lime and Portland Cement Co.

notice that an engine had been coupled on at the farther end. The result was—one man killed and one permanently disabled.

We frequently see in the monthly bulletins published by the Portland Cement Association that fatal accidents or permanent disabilities have resulted from carelessness in switching or coupling cars when safety rules were overlooked or disregarded.

Loading runways, or planks used for loading or unloading cars, should never be left extending from car doors when work is left temporarily unfinished or completed, and should always be removed before cars are switched. All such runways should be removed before quitting time in the evening, so that if a switch engine moves the cars, equipment will not be damaged, nor men injured. Also in case of fire it might be necessary for men to run between cars which would be very dangerous.

When unloading box cars, material

should never be thrown out without having a guard outside. I have personally seen several accidents, which occurred while unloading railroad ties, because the outside was not guarded.

Grading along and between tracks, where switchmen may pass frequently, should be leveled with amply wide shoulders, and the ballast should not be of too coarse material.

Although many suggestions could be offered regarding safety hazards connected with the railroad in the yard, I have only mentioned a few of the more important ones.

## Locomotive Crane Hazards

Another cause for yard hazards are the locomotive cranes, which are extensively used in many plants. Definite rules should be adopted not to walk under boom or bucket of crane, whether it is in operation or at rest.

Care should be taken when swinging cranes, to assure that loads or loose slings do not hit anyone passing by.

Great care should be used in making fastenings when material is handled with cranes or other power devices, to prevent slings or hooks from slipping or coming loose.

The bucket should always be lowered to the ground when a crane is out of service for any length of time, or at quitting time.

Signs should be placed at both ends, some distance away, when a crane or switch locomotive is under repair, and the machine should be in such cases well blocked.

Speed limits should be established and maintained prohibiting automotive vehicles from speeding through the yards.

Good housekeeping in the yard plays a very important part in the prevention of accidents, as well as being an essential factor in adding to the attractiveness of the plant. Special locations should be provided for rubbish and others for scrap material which can be trucked away at regular times, before a great amount has accumulated.

Weeds should not be allowed to grow in yards to an excessive height as they provide an excellent place to throw waste, and when they dry out in the fall, they also create a very dangerous fire hazard.

Excavation for ditches and sewers should never be attempted by one man. It is considered a good investment to have not less than two experienced men engaged in this kind of work; and they should be instructed to use their best judgment toward preventing a cave-in and use cribbing when necessary. When work is left unfinished at the close of the day, a railing should be installed around the excavation supporting a sufficient number of warning lights.

I heard a statement the other day from a telephone and telegraph company, that its experience figure showed fourteen times as many accidents were caused by post holes, as by post and line work.

#### **Guarding Open Manholes**

We have at Louisville adopted the practice of using a light pipe railing around manholes for sewer, water or underground cable ducts, when a cover is removed. One man can easily carry this safeguard from one place to another.

The railroad companies have an active rule regarding a minimum distance between center of tracks and other obstructions. This rule can and should be observed by plants operating industrial tracks where the railroad engines do not switch.

Electric wiring should not be allowed, even temporarily, to be strung over the ground.

Construction jobs should be cleared regularly, and especially when concrete forms have been taken down. The lumber should be piled in an orderly way, and no boards or lumber pieces be allowed to lie around with nails exposed.

A common practice at many plants is to start new men in the yard department and at a later date pick out the best ones for operators or other jobs. All new men should be thoroughly instructed as to the hazards of their job, as it is important that they get the safety habit from the very first start.

My experience is that a regular yard man temporarily employed in a mill department is usually a safe one, as he is somewhat scared and feels that everybody is watching him. While only a few men are usually exposed to the hazards peculiar to the different departments, the whole organization is exposed to the yard hazards, and for this reason yard safety rules should be strictly enforced.

The foreman should be held responsible for such hazards as snowy roofs, icicles, unnecessary cluttering up of material in yards, and other miscellaneous hazards.

#### **Yard Hazards Greatest**

Most accident prevention campaigns stress the hazards around machinery. However, I believe that the yard operations involve far more dangerous activities than machinery. I base my statement upon the theory that manufacturers are constantly introducing safety devices, and continually cautioning their workmen regarding machine accidents; but they neglect to stress yard hazards. In a report made by the Industrial Commission of Wisconsin, the statement is made:

"We must conclude that the great majority of accidents are not preventable by guards. If every danger point on every machine were perfectly guarded, making accident impossible, then we would have eliminated just about one-fourth of all accidents."

Preach "Safety First" to the foremen and men all the time, and get the employees so interested they will take their safety-first and accident prevention-ideas to their homes. We will then have a first-class organization of safety workers who have practiced safety in their homes, and have secured the interest of their wives and children in this movement.

We should try to develop in the mind of each individual an interest in co-operation and preparation against any tragic incident that might happen to him or his fellow workers as a result of his lack of safety education. I believe that we, as interested safety workers, should devote a portion of our daily time to forewarning our employees and bringing them to a realization of how essential it is to the happiness and security of themselves and their families that they shall have whole bodies.

pipe but should be attached by some sort of rolled joint. Proper gaskets should be used.

Long radius pipe bends must be used to avoid undue expansion stresses. These are especially important near outlets of boilers and where pipe is attached to steam using equipment.

Automatic non-return valves should be used if more than a single boiler is connected to a header.

Waste-heat boilers make use of their



**C. M. Carman, Universal Atlas Cement Co., Independence, Kan.**

## **Safety in Waste-Heat Departments**

**By C. M. Carman**

**T**HERE is no department in a cement plant where proper design plays such an important part in determining the general safety of the department as is the case in the boiler room. This is especially true in a waste-heat plant.

We are not concerned here with safe design of boilers. As all reputable boiler makers build their boilers to conform to certain established safety codes we can pass over that part.

We as operators are responsible in that it is up to us to so install, so equip, and so operate a boiler plant that there will be little chance of an accident.

We therefore must keep before us the fact that high pressure steam is potentially

dangerous, and we must handle it with care.

As the design of a boiler room is such a vital factor in making it a safe department, I will touch briefly on a few of the essentials that must be considered.

Starting with the boiler, we must first select a suitable one for our particular needs. We must then erect it in a safe manner so as not to damage it before it is in operation. It should be bricked up in such a manner that both the boiler and the brick setting be free to move independently under heat stresses.

We must see that all of the fittings are of suitable material for the service required. The use of steel fittings is recommended. Flanges should not be screwed on to the

safety valves more frequently and for longer periods of time than do fuel burning boilers. The rate of feeding fuel in the ordinary boiler is under the control of the boiler operator in the case of fuel burning boilers.

This is not the case in a waste-heat system as the burners in the kiln room control this. Thus a waste-heat plant takes whatever heat that is available and uses it in making steam regardless of whether the steam is needed or not.

As a result there are often times when excess steam is produced which must be gotten rid of through the safety valves.

I have found it good practice then to pay more attention to the condition of safety valves on a waste-heat boiler than would be necessary in an ordinary boiler. We inspect these frequently and look them over internally whenever a boiler is out of service.

It is important that escape pipes be provided for the discharge side of the safety valves, but these should lead up through the roof and never be installed in a horizontal manner.

Gage glasses should be clearly visible and properly lighted by a shaded electric light.

If economizers are used, they should be protected from pump pulsation strains if reciprocating boiler feed water pumps be used. This can be done by means of a relief valve with an air chamber.

We have had trouble with broken headers on economizers. These are cast iron. We have protected the operators by covering these headers with heavy steel shields so that in case of a ruptured header no one will be scalded.

There is usually very little moving machinery to be guarded in a boiler room. But such as there is should be protected.

I have found that dust causes most of the hazards in a waste-heat plant. This is dust carried out of the kilns with the waste gases. This dust settles in the flues between the kilns and the waste-heat boilers and must be removed.

It builds up in the boilers and must be constantly cleaned out. It cuts out the boiler tubes and wears out the blades of the draft fans.

In removing this dust we use lances and compressed air. We originally used lances and high pressure steam. This was discontinued because it was unsafe.

As the dust is so abrasive and cuts out the boiler tubes in the last pass we have to watch these tubes carefully. Normally we wash our boilers at intervals of four months. At such times we carefully examine the tubes in the group subject to wear.

The blades of the draft fans pulling the gases through the kilns and boilers wear out about every four to six months. By making frequent inspections we keep informed as to the condition of each fan. If a fan runs in an unbalanced condition due to wear, it is immediately inspected and repaired.

The dust drawn from the hot flue between the kilns and boilers and from the boiler settings must be carefully handled. This is because this dust ranges in temperature from 1500 deg. to 350 deg. F., depending upon which part of the system it covers.

We have made every effort to keep this dust inside of a spout or inside of a conveyor box. It runs like water and when using the compressed air lances, care must be taken that nothing is blown out where it can injure anyone. We have all of our dust blowers wear goggles and so far have had no lost time accidents from dust burns.

We handle the recovered dust in a screw conveyor designed to handle the high temperatures and designed to keep the dust in the box and men out.

The men operating waste heat as well as other boilers are picked men. We want men for this work ready for all emergencies.

The fact that our plant is designed to operate safely and is manned by safe men has resulted in our having had but two lost time accidents in this department in nine years. We have had none since July, 1926.

## Registration

Ash Grove Lime and Portland Cement Co., Louisville, Neb.

A. K. Frolich, superintendent.  
J. W. Kimbrell, mill foreman.  
David W. Webb, chief draftsman.  
K. V. White, chief clerk.  
Eugene Wheeler, construction foreman.

Ash Grove Lime and Portland Cement Co., Kansas City, Mo.

L. Kittle, auditor.  
W. P. Sabin, secretary and assistant to president.  
L. T. Sunderland, president.

Ash Grove Lime and Portland Cement Co., Chanute, Kan.



C. P. Mitchell, Monarch Cement Co.

Guy O. Gardner, superintendent.  
O. D. Nelson, fuel agent.  
C. C. Reid, chief clerk.  
L. D. Trammel.

Ash Grove Lime and Portland Cement Co., Ash Grove, Mo.

Fred L. Willis, powder man.

Consolidated Cement Corp., Mildred, Kan.

J. J. Adams, machine shop foreman.  
A. L. Allison, machinist.  
Jess Bigelow.  
E. L. Drury, assistant superintendent.  
Everett Flack, electrician.  
Bert Hooker, quarry foreman.  
R. M. Johnson, district superintendent.  
Ray Lineback, repairman.  
J. D. Meador, assistant chemist.  
R. A. Schweizer, purchasing agent.  
Paul Wagner.  
F. N. Walton.

Consolidated Cement Corp., Fredonia, Kan.

L. T. Callier, quarry foreman.  
J. W. Dennis, chief chemist.  
Clarence Lamoreaux, assistant chemist.  
T. F. McClaren, shipping clerk.  
W. E. McVey, mill foreman.  
William Palmer, superintendent.  
J. M. Upton, burner.  
Charles Verchere, chief clerk.  
Harold Isackson, stockkeeper.

Dewey Portland Cement Co., Dewey, Okla.

P. R. Chamberlain, superintendent.  
Ray A. Duncan.  
Gerald O. Lockwood, first-aid director.  
R. A. Loveland, chemist.  
L. A. Parrish.  
John Myers.  
James R. Smith, burner.  
D. M. Turly.  
J. H. Turman, foreman.  
F. L. Tyler.

Lehigh Portland Cement Co., Iola, Kan.

B. Chambers, shift foreman.  
M. H. Creviston, yard foreman.  
Jim Fisher, quarry foreman.  
C. W. Gilbert, construction foreman.  
R. E. McDonald, chief engineer.  
R. D. Monz, repair foreman.  
James O. Myers, machine shop foreman.  
J. G. Stadler, chief chemist.  
C. A. Swiggett, superintendent.

Lone Star Cement Co. Kansas, Bonner Springs, Kan.

E. M. Clark, electrician.  
George Davenport, shovel operator.  
J. W. Ditto, general mill foreman.  
J. H. Griffith, assistant chemist.  
G. P. Holmes, mill foreman.  
Nathan C. Kevins, timekeeper.  
W. B. Mills, repair foreman.  
R. C. Moore, repairman.  
Lewis P. Overton, yard foreman.  
C. W. Kerns, mill foreman.  
C. P. Steventon, purchasing agent.  
C. E. Stith, shop foreman.

Louis J. Wheeler, superintendent.

Lone Star Cement Co. Kansas, Kansas City, Mo.

E. Struckmann, general superintendent.  
J. A. Lehaney, vice-president and manager.

Missouri Portland Cement Co., Cement City, Mo.

William H. Harle, machine-shop foreman.  
Missouri Portland Cement Co., Independence, Mo.

G. W. Burgess, assistant superintendent.  
E. G. Fetic, repairman.  
V. K. Newcomer, superintendent.

Missouri Portland Cement Co., Kansas City, Mo.

L. M. Atkins, master mechanic.

Missouri Portland Cement Co., Sugar Creek, Mo.

D. A. Aubrey, timekeeper.  
Grant Bush, mill foreman.

Clark Galvin, repair department.

W. I. Gorton.

W. L. Horton, oiler.

G. M. Hutcheser, drill foreman.

H. B. Irving.

Thomas James Kehoe, electrician.

Herman Ralston.

T. S. Rash, drill foreman.

F. C. Twyman, carpenter foreman.

Monarch Portland Cement Co., Humboldt, Kan.

Sam Barrackman, truck driver.

Carl B. Boyer, crane man.

T. M. Clement, boiler department.

John G. Hall, assistant chemist.

H. H. Harding.

Elmer Hunt, shooter.

H. P. Lehrack, carpenter.

G. J. Longbine, repairman.

Harvey Markle, machine foreman.

C. P. Mitchell, superintendent.

Howard Moor, Jr., night kiln foreman.

John H. Norris, mill foreman.

E. R. Williams, repairman.

Universal Atlas Cement Co., Hannibal, Mo.

V. V. Jones, quarry and mine superintendent.

Paul Kirkbride, assistant superintendent.

Universal Atlas Cement Co., Independence, Kan.

C. M. Carman, superintendent.

Howard V. Crowe, finish mill operator.

Fred J. Davis, personnel director.

Dave Eifler, foreman carpenter—chairman safety committee.

Charles Miller, physical tester.

Miscellaneous

George H. Craner, state factory inspector, Mo.

line, Kan.

A. J. R. Curtis, Portland Cement Association,

Chicago, Ill.

B. H. Davies, combustion engineer, W. S.

Dickey Clay Manufacturing Co., Kansas City,

Mo.

Sergt. V. C. Dobson, Kansas City police de-

partment, Kansas City, Mo.

William Flickinger, repair, Red Ring Portland

Cement Co., Cement City, Mo.

V. A. Giberson, safety director, Bluff City Lime

and Stone Co., Ste. Genevieve, Mo.

C. F. Herbert, foreman miner, U. S. Bureau of

Mines, Vincennes, Ind.

J. C. Josse, sales manager, Mid-West Steel Co.,

St. Louis, Mo.

F. V. Meriwether, surgeon, U. S. Bureau of

Mines, Picher, Okla.

W. D. Ryan, safety commissioner, U. S. Bu-

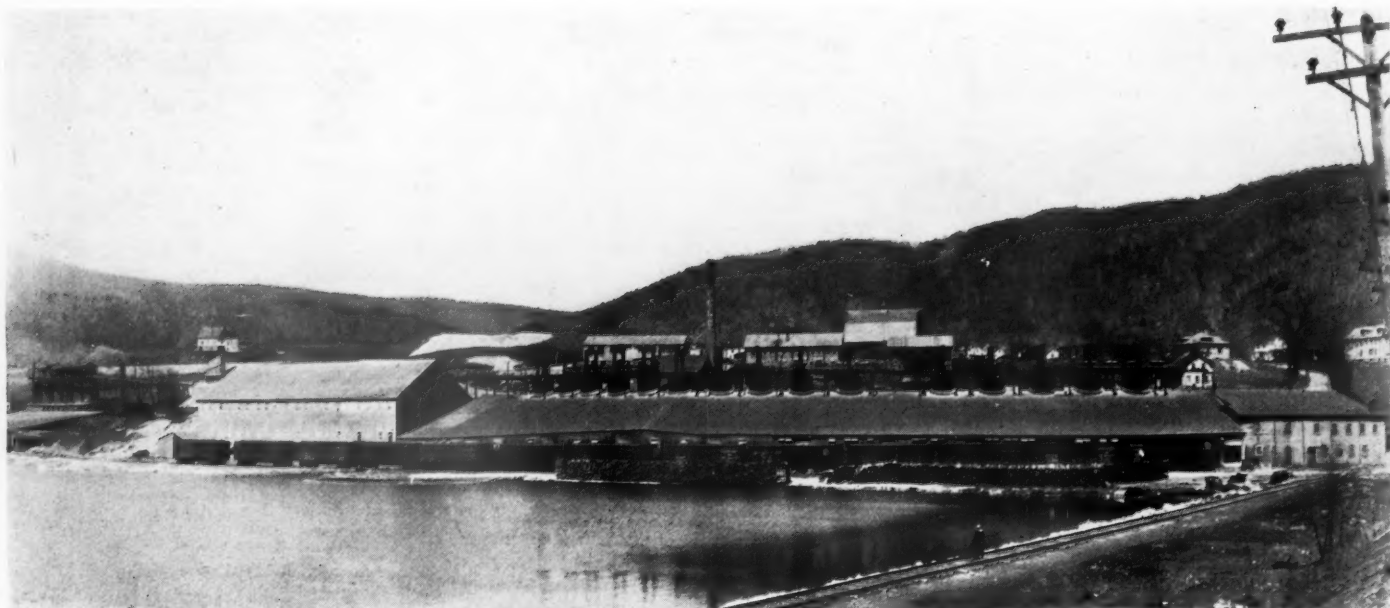
reau of Mines, Kansas City, Mo.

James G. Tigerman, district manager, Republican

Plow Meters Co., Kansas City, Mo.

## First-Aid Contest

The contest of first-aid teams, which formed the closing feature of the program, was conducted by the U. S. Bureau of Mines. At the conclusion of the contest the Portland Cement Association cup was awarded to the team of the Dewey Portland Cement Co. as winner. The team representing the Chanute, Kan., plant of the Ash Grove Lime and Portland Cement Co. received second honors, that of the Missouri Portland Cement Co.'s plant at Independence, Mo., third honors and the teams representing the Mildred and Fredonia (Kan.) plants of the Consolidated Cement Corp. tied for fourth place.



*The Farnam Cheshire Lime Co. plant at Farnams, Mass.*

## United States Gypsum Company Buys Farnam Cheshire Lime Company

**C. J. Curtin, Former Head of Lime Company,  
Will Continue to Manage Manufacture and Sales**

THE United States Gypsum Co., Chicago, Ill., has officially announced the purchase and amalgamation of the Farnam Cheshire Lime Co., Farnams and Great Barrington, Mass. C. J. Curtin, who was president of the lime company with headquarters at New York City, will continue to manage the manufacturing and sales departments as a member of the United States Gypsum Co.'s organization.

Both plants of the Farnam Cheshire Lime Co. have been described briefly in previous issues of *ROCK PRODUCTS*. From these and other data at hand the editors are able to illustrate and describe these important Massachusetts lime properties in the following paragraphs.

The Farnams plant is a shaft-kiln operation consisting of 16 gas, coal and wood-fired kilns, and 5 gas-fired Mount kilns. The original 16 shaft kilns were the ordinary type of steel-shell, open-top kilns, but within the

last few years these have been rebuilt and the tops closed except for short stocks to provide natural draft. It is said this plant contained the second installation of gas-fired kilns made in this country.

The Farnams quarry is particularly interesting. It is between two hills or ridges and the only access to it is through two tunnels bored through the ridge nearest the plant. The quarry face is roughly circular. The stone is a high calcium limestone rang-

ing from 98.96% to 99.46%  $\text{CaCO}_3$ .

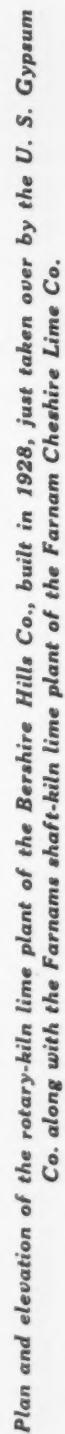
The Great Barrington plant of the Farnam Cheshire Lime Co. was operated as the Bershire Hills Co. It is one of the newest rotary kiln lime plants and has some very interesting features. There is one 7 x 125-ft. Vulcan rotary kiln and a 4-ft. x 40-ft. rotary cooler, with space provided for a second unit. The kiln and cooler are each belt driven, the kiln by a 35-hp. motor and the cooler by a 10-hp. motor.

The limestone is quarried adjacent to the plant and brought by rail with two 7-ton Whitcomb gasoline locomotives and 2- and 3-yd. side-dump, narrow-gauge cars to a 16-in. Traylor "Bull Dog" gyratory crusher, reducing the quarry stone to minus 1½-in. The feed hopper to the crusher holds about 3 carloads.

A 16-in. Stephens-Adamson belt conveyor, anti-friction bearings, with Alemitte lubrication carries the crusher output to a crushed-



*Coming out of the tunnel at the Farnams quarry*



stone storage—covered bins, which are a rather unusual feature in lime-plant construction, but were deemed desirable in this case on account of the severe winter conditions. An S-A tripper dumps the stone to various bin compartments.

Two tunnels are provided under the bins, one for each of two kilns. A movable Schaffer poidometer measures the stone as it is drawn from the bins to a 14-in. belt conveyor which feeds the kiln bin. Westinghouse tachometers are used for synchronizing the speeds of the Schaffer poidometer and kiln drives. The poidometer motor is of a new type having shifting brushes which give variable speeds.

The lime is taken from the end of the cooler by a screw conveyor to an elevator and distributed to bins over the barrel packers.

Oil is used for fuel.

The power current throughout the plant is 440-v., 3-phase, 60-cycle. General Electric motors are used for all drives.

#### **Massachusetts Limestone Belt**

The two plants are located in one of the



**C. J. Curtin**

most famous and most interesting (geologically) limestone regions of the United

States. This region has been explored and described in some detail in Bulletin 744 of the U. S. Geological Survey by T. Nelson Dale. Both dolomite and high calcium limestones are available in most parts of the belt. It is the same formation that includes the Dover Plains, N. Y., plant of the Kelley Island Lime and Transport Co. and the Adams, Mass., plants of the New England Lime Co. and the Hoosac Valley Lime Co.

The limestone strata have been powerfully corrugated and upended, and apparently subjected at some time to terrific pressures. Consequently the character of the limestone varies considerably in different exposures and it is difficult to estimate resources of any particular kind of stone available.

The United States Gypsum Co. already had a dolomite crushing and pulverizing plant within a short distance of the Great Barrington lime plant.

#### **An Interesting History**

Lime has been manufactured at the Farnams plant since 1847, the pioneer lime-



**The Farnams quarry at Farnams, Mass., is located in one of the most famous limestone regions of the United States**

## Production of Potash in 1929

maker there being Duane Northrup. At the close of the Civil war the property was bought by Alfred and Albert Farnam. It was then a small concern, but they enlarged and equipped it with modern machinery and ran it successfully until 1904, when they sold out to the Curtin brothers for a reported price of \$60,000.

The Farnam Cheshire Lime Co. owns approximately 6000 acres of land, mainly forest, in Cheshire, Dalton and Lanesboro. In Cheshire alone the company has 1382 acres, the assessed valuation of its property there for this year being \$240,940. The company is the largest land owner and the largest taxpayer in the town. The concern has 250 acres at Sheffield.

At present six lime quarries are in operation in Berkshire county. These are the two of the Farnam Cheshire Lime Co., one each of the Deely Lime Co. at Lee and West Stockbridge, one of the New England Lime Co. at Adams and one of the Miller Lime Products Corp. at West Stockbridge. At least a dozen such quarries were being operated a generation ago.

**P**OTASH PRODUCED in the United States in 1929 amounted to 107,820 short tons of potassium salts, equivalent to 61,590 short tons of potash ( $K_2O$ ), according to the United States Bureau of Mines, Department of Commerce. Sales by producers amounted to 101,370 tons of potassium salts with an equivalent of 57,540 tons of  $K_2O$ . The potash materials of domestic origin, sold by producers in 1929, were valued at \$2,988,448, f.o.b. plants. About 12,650 tons of potassium salts, with an available content of 6200 tons of  $K_2O$ , remained in producers' stocks December 31, 1929. The output increased 3.5% in gross weight, with an increase of 3% of  $K_2O$  content. The sales of salts decreased 4%, with a decrease of 5% in  $K_2O$  content. The total value of the sales decreased 1%. Stocks of crude salts remaining in the hands of producers at the end of 1929 were twice as much as at the end of 1928. The production was chiefly from natural brines in California and distillery residue from molasses in

Maryland. Small amounts were also obtained from steel plant dust in Virginia, and Steffen's water in Indiana. A small amount of alunite was shipped from Utah.

The potassium salts imported for consumption into the United States in 1929, according to the Bureau of Foreign and Domestic Commerce, amounted to 929,819 short tons. The estimated  $K_2O$  equivalent of these imports is 325,000 short tons. This represents a decrease of 4.7% in gross weight over the imports for 1928. The total value of the imports was \$23,719,656, which was 5% more than for 1928. The potassium salts imported chiefly for fertilizer amounted to 870,502 short tons ( $K_2O$  approximately 297,000 tons), valued at \$17,629,535. This was a decrease of 6.5% in quantity and 3% in value.

The potassium salts imported for the chemical industry amounted to 59,317 tons ( $K_2O$  content approximately 28,000 tons), valued at \$6,090,121, an increase of 35% in total quantity and of 42% in value.



*Another view of the Farnams quarry, the only access being through two tunnels located at the lower right corner of the picture*

# The Rock Products Market

## Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

### Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, 3/4 in. and less	Gravel, 1/2 in. and less	Gravel, 1 in. and less	Gravel, 1 1/2 in. and less	Gravel, 2 in. and less
<b>EASTERN:</b>						
Asbury Park, Farmingdale, N. J.	.48	.48	1.15	1.25	1.40	.....
Spring Lake and Wayside, N. J.	.75	.75	.75	.75	.75	.75
Attica and Franklinville, N. Y.	1.25	1.15	1.75	.....	1.75	1.75
Boston, Mass.	1.00	1.05	1.05	1.05	1.05	1.05
Buffalo, N. Y.	.70	.95	1.40	1.40	.....	.....
Erie, Penn.	.75	.75	.75	.....	.75	.75
Machias Junction, N. Y.	.....	.....	1.75	.....	1.25	1.00
Milton, N. H.	1.00	.60	.50	.50	.50	.40
Montoursville, Penn.	.35-.50	.35-.50	1.25	.90-1.25	.90-1.25	.....
Northern New Jersey	.....	1.00	2.25	.....	.....	.....
South Portland, Me.	.55	.55	1.20	1.20	1.00	1.00
Washington, D. C.	.....	.....	.....	.....	.....	.....
<b>CENTRAL:</b>						
Appleton, Minn.	.....	.50	1.25	.....	1.50	.....
Attica, Ind.	.....	.....	All sizes	.75-.85	.....	.....
Barton, Wis.	.....	.40d	.50d	.60d	.60d	.60d
Algonquin, Ill.	.60	.30	.30	.40	.40	.40
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Des Moines, Iowa	.40-.60	.60-.80	1.50-1.70	1.50-1.70	1.50-1.70	1.50-1.70
Eau Claire, Wis.	.40	.40	.55	.85	.85	.....
Elkhart Lake and Glenbeulah, Wis.	.40	.40	.60	.60	.60	.60
Grand Rapids, Mich.	.....	.50	.80	.80	.80	.70
Hamilton, Ohio	.65-.75	.65-.75	.65-.75	.65-.75	.65-.75	.65-.75
Hersey, Mich.	.....	.50	.70	.70	.70	.70
Humboldt, Iowa	.40-.50	.40-.50	1.10-1.30	1.10-1.30	1.10-1.30	1.10-1.30
Indianapolis, Ind.	.50-.60	.25-.60	.40-.60	.45-.75	.45-.75	.45-.75
Kalamazoo, Mich.	.....	.80	1.10	1.10	1.10	1.10
Kansas City, Mo.	.70	.70	.....	.....	.....	.....
Mankato, Minn.	.55	.45	1.25	1.25	1.25	.....
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
St. Paul, Minn. (c)	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.	.....	.45	.60	.65	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
<b>SOUTHERN:</b>						
Brewster, Fla.	.40	.40	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.40-.50	.....	.....	.....	.....
Fort Worth, Texas	.75	.75	1.00	1.00	1.00	1.00
Knoxville, Tenn.	.85	1.00	1.20	1.20	1.20	1.20
Roseland, La.	.30	.30	.70	.70	.60	.70
<b>WESTERN:</b>						
Los Angeles, Calif.	.10-.40	.10-.40	.20-.90	.50-.90	.50-.90	.50-.90
Oregon City, Ore.	3.00-3.50g	1.00-1.50	1.00-1.50	1.00-1.50	1.00-1.50	1.00-1.50
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.70	.60	1.15	1.20	1.15	1.15
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

\*Cu. yd. †Delivered on job by truck. (d) Plus 15c for winter loading. (e) Prices f.o.b. N. P. Ry.

### Core and Foundry Sands

City or shipping point	Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	.....	2.00	2.00	2.25	.....	.....	4.00	.....
Cheshire, Mass.	.....	.....	.....	.....	.....	.....	6.00-8.00	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	.....	2.50-3.00	.....
Elco, Ill.	.....	.....	.....	.....	.....	.....	.....	1.00
Kasota, Minn.	.....	.....	.....	.....	.....	.....	.....	.....
Montoursville, Penn.	.....	.....	.....	.....	1.35-1.60	.....	.....	.....
New Lexington, Ohio	.....	2.00	1.50	.....	.....	.....	.....	.....
Ohlton, Ohio	.....	1.75*	1.75*	.....	2.00*	.....	1.75*	1.75*
Ottawa, Ill.	.....	1.25-3.25	2.25-3.50	1.25-3.25	1.25-3.25	.....	1.25	3.50
Red Wing, Minn. (a)	.....	3.50†	5.00†	3.50†	2.50-3.50†	.....	1.50	3.00
San Francisco, Calif.	.....	.....	.....	.....	.....	.....	5.00†	3.50-5.00†

†Fresh water washed, steam dried. \*Damp. (a) Filter sand, 3.00.

### Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	.....	1.50
Eau Claire, Wis.	4.30	.50-1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25-3.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

### Glass Sand

City or shipping point	Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. plant.
Cheshire, Mass., in carload lots	5.00-7.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00-5.00
Silica and Mendota, Va.	2.50-3.00

### Bank Run Sand and Gravel

Prices given are per ton, f.o.b. producing plant or nearest shipping point.

Appleton, Minn.†	.55
Algonquin, Ill.† (1/2 in. and less)	.30
Brewster, Fla. (sand, 3/4 in. and less)	.40-.50
Burnside, Conn. (sand, 3/4 in. and less)	.75*
Chicago, Ill., and Grand Haven, Mich.†	.92-1.20
Des Moines, Ia. (sand and gravel mix)	.60-1.05
Fort Worth, Tex.† (2-in. and less)	.65
Gainesville, Tex.† (1-in. to 2-in.)	.55
Gary and Miller, Ind.†	1.15-1.40a
Grand Rapids, Mich.† (1-in. and less)	.55
Hamilton, Ohio† (1 1/2 in. and less)	.50-1.00
Hersey, Mich.† (1-in. and less)	.50
Kalamazoo, Mich.	1.85b
Mankato, Minn.†	.70
Oregon City, Ore.—All sizes at bunkers	1.00-1.50
Pueblo, Colo.—†River run sand	.50
Winona, Minn.†	.60
York, Penn. Sand, 3/4 in. and less, 1.00; 1/10 in. down	1.10
*Cubic yard. †Fine sand, 1/10 in. down. (a) Cu. yd., delivered Chicago. (b) 1 1/2 cu. yd. ‡Gravel.	

### Current Price Quotations

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

### Portland Cement

	Per Bag	High Early Per Bbl. Strength
Albuquerque, N. M.	.91 1/4	3.20
Atlanta, Ga.	.....	1.99
Baltimore, Md.	.....	2.26
Berkeley, Calif.	.....	2.14
Birmingham, Ala.	.....	1.65
Boston, Mass.	.57	1.78-1.88
Buffalo, N. Y.	.61 1/4	1.95-2.05
Butte, Mont.	.90 3/4	3.61
Cedar Rapids, Ia.	.....	2.03-2.16
Centerville, Calif.	.....	2.14
Charleston, S. C.	.....	2.09a
Cheyenne, Wyo.	.71 1/2	2.36
Chicago, Ill.	.....	1.75
Cincinnati, Ohio	.....	1.92-1.94
Cleveland, Ohio	.....	1.84
Columbus, Ohio	.....	1.92-1.97
Dallas, Texas	.....	1.65
Davenport, Iowa	.....	1.94-2.04
Dayton, Ohio	.....	1.94
Denver, Colo.	.63 1/4	2.55
Des Moines, Iowa	.48 1/2	1.94
Detroit, Mich.	.....	1.75
Duluth, Minn.	.....	1.84
Fresno, Calif.	.....	2.33
Houston, Texas	.....	1.75
Indianapolis, Ind.	.54 3/4	1.79
Jackson, Miss.	.....	2.09-2.29
Jacksonville, Fla.	.....	2.14b
Jersey City, N. J.	.....	2.13
Kansas City, Mo.	.48	1.92
Los Angeles, Calif.	.36 1/2	1.46
Louisville, Ky.	.55 1/2	1.92
Memphis, Tenn.	.....	2.09-2.29
Merced, Calif.	.....	2.01
Milwaukee, Wis.	.....	1.90
Minneapolis, Minn.	.....	2.07
Montreal, Que.	.....	1.60†
New Orleans, La.	.43	1.82
New York, N. Y.	.60 3/4	1.93-2.03
Norfolk, Va.	.....	1.87-1.97
Oklahoma City, Okla.	.59	2.36
Omaha, Neb.	.56 1/2	2.26
Peoria, Ill.	.....	1.92
Pittsburgh, Penn.	.....	1.75
Philadelphia, Penn.	.....	2.15
Phoenix, Ariz.	.....	3.51
Portland, Ore.	.....	2.30
Reno, Nev.	.....	2.76
Richmond, Va.	.....	2.16-2.32
Sacramento, Calif.	.....	2.25
Salt Lake City, Utah	.70 3/4	2.81
San Antonio, Texas	.....	.....
San Francisco, Calif.	.....	2.04
Santa Cruz, Calif.	.....	2.10
Savannah, Ga.	.....	2.09a
St. Louis, Mo.	.48 3/4	1.75
St. Paul, Minn.	.....	2.07
Seattle, Wash.	.....	1.90
Tampa, Fla.	.....	1.80
Toledo, Ohio	.....	2.00-2.03
Topeka, Kan.	.52 3/4	2.11
Tulsa, Okla.	.55 3/4	2.23
Wheeling, W. Va.	.....	1.92-2.02
Winston-Salem, N. C.	.....	2.14

Mill prices f.o.b. in carload lots, without bags, to contractors.

Albany, N. Y.	2.15
Bellingham, Wash.	2.25
Buffington, Ind.	1.70
Chattanooga, Tenn.	2.05
Concrete, Wash.	2.65
Davenport, Calif.	2.05
Hannibal, Mo.	1.90
Hudson, N. Y.	1.75
Leeds, Ala.	1.65
Lime & Oswego, Ore.	2.40
Mildred, Kan.	2.35
Nazareth, Penn.	2.15
Northampton, Penn.	1.75
Richard City, Tenn.	2.05
Steeleton, Minn.	1.85
Toledo, Ohio	2.20
Universal, Penn.	1.70

NOTE: With exception of prices for "Incor" and "Velo" cement, prices quoted are net prices, without charge for bags, and all discounts deducted. Add 40c per bbl. for bags. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. (f) "Velo" cement, including cost of paper bag, 10c disc. 10 days. †"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days. ‡Includes sales tax.

# Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

## Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
<b>EASTERN:</b>						
Buffalo, N. Y.	1.35	1.35	1.35	1.35	1.35	1.35
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.		1.30	1.10	1.00	1.00	
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.10
Jamesville, N. Y.	.60	1.00	1.00	1.00	1.00	
Oriskany Falls, N. Y.	.50-1.00	1.00-1.35	1.00-1.35	1.00-1.35	1.00-1.35	1.00-3.00
Prospect Junction, N. Y.	.50-.80	1.15u	1.15	1.10	1.10	1.10
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Shaw's Junction, Penn. (e)	.85	1.20-1.35	1.20-1.35	1.20-1.35	1.40	1.30-1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
<b>CENTRAL:</b>						
Alton, Ill. (b)	1.85		1.85			
Cypress, Ill.	1.15	1.10	1.00	1.15	1.15	1.20
Davenport, Iowa	1.00	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.00	1.00	1.20	1.10	1.10	
Dundas, Ont.	.50	.80	.80	.80	.80	.80
Stolle and Falling Springs, Ill.	1.05-1.70	.95-1.70	1.15-1.70	1.05-1.70	1.05-1.70	
Greencastle, Ind.	1.25	1.10	1.10	1.00	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75-1.00	1.65-1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.00	1.00	1.00	1.00		
Stone City, Iowa	.75		1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70		1.60		1.60
Toronto, Canada (i)	2.70	2.70	2.50	2.50	2.50	2.50
Waukesha, Wis.		.90	.90	.90	.90	
Wisconsin points	.50		1.00	.90	.90	
<b>SOUTHERN:</b>						
Cartersville, Ga.	1.40	1.50	1.50	1.15	1.00	1.00
Chico and Bridgeport, Texas	.50	1.30	1.30	1.25	1.20	
Cutler, Fla.	.50-.75r			1.75r		1.10g
El Paso, Texas	.50-.75		1.25	1.00	1.00	1.00
Graystone, Ala.		Crusher run stone 1.00 per net ton				
Olive Hill, Ky.	.50-1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50-.75	1.40-1.60	1.30-1.40	1.15-1.25	1.10-1.20	1.00-1.05
<b>WESTERN:</b>						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	
Richmond, Calif.	.75		1.00	1.00	1.00	
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45
Stringtown, Okla.	.50	1.30	1.30	1.25	1.20	

## Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35		1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	
Duluth, Minn.	.90-1.00	2.25	1.75	1.75	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knappa, Texas		2.00	1.45	1.20	1.15	
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	
Northern New Jersey	1.35-1.40	1.40-2.10	1.40-1.90	1.40-1.50	1.40-1.50	
Richmond, Calif.	.70		1.00	1.00	1.00	
Toronto, Canada (i)	4.70	5.80		4.05		
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

## Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite			1.75	1.75	1.60	
Chicago, Ill.—Granite	2.00	1.70		1.50	1.50	
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.75	1.50	1.25	1.25	
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	
Middlebrook, Mo.—Granite	3.00-3.50		2.00-2.25	2.00-2.25		1.25-3.00
Richmond, Calif.—Quartzite	.75		1.00	1.00	1.00	
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(a) Limestone, ¼ to ½ in., 1.35 per ton; Lime flour, 8.50 per ton. (b) Wagonloads. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c discount deducted. (g) Per cu. yd., 3-in. and less. (h) Rip rap. (i) Plus 25c per ton for winter delivery. (n) Ballast, R.R., .90; run of crusher, 1.00. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cu. yd. (t) Rip rap, 1.20-1.40 per ton. (u) ¾-in. and less.

## Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Allentown, Penn.	1.00-1.50	.40-.60	.80-1.00	.50-.80	.50-.80	.60-.80	.80
Bethlehem, Penn.	1.25-1.75	.50-.70	1.00-1.25	.60-.80	.70-.80	.70-.90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.25-1.75	.60	.90	.60-.90	.60-.90	.60-.90	
Reading, Penn.	2.00	1.00		1.00			
Swedeland, Penn.	1.50-2.50	.60-1.10	1.00-1.25	.90-1.25	.90-1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25

<b>CENTRAL:</b>							
Ironton, Ohio	1.30*	1.80*	1.55*	1.55*	1.45*		
Jackson, Ohio	1.05*	1.80*	1.45*	1.30*	1.30*		
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	

<b>SOUTHERN:</b>							
Ashland, Ky.		1.05*	1.80*	1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*		1.15*	.90*	.90*	

\*5c per ton discount on terms. †1½ in. to ¾ in., 1.05\*; ¾ in. to 10 mesh, 1.25\*; ¾ in. to 0 in., .90\*; ¼ in. to 10 mesh, .80\*.

## Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% CaCO <sub>3</sub> ; 0% MgCO <sub>3</sub> ; 90% thru 100 mesh	4.50
Belfast, Me.—Analysis, CaCO <sub>3</sub> , 90.4%; MgCO <sub>3</sub> , trace; 90% thru 100 mesh, per ton	10.00
Branchton, Penn.—94.89% CaCO <sub>3</sub> ; 1.50% MgCO <sub>3</sub> ; 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh; per ton	5.00
Cape Girardeau, Mo.—Analysis, CaCO <sub>3</sub> , 94½%; MgCO <sub>3</sub> , 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.	2.00
Davenport, Iowa—Analysis, 92-98% CaCO <sub>3</sub> ; 2% and less MgCO <sub>3</sub> ; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags.. CaCO <sub>3</sub> ; 90% thru 200 mesh	3.70
Joliet, Ill.—Analysis, 50% CaCO <sub>3</sub> ; 44% MgCO <sub>3</sub> ; 90% thru 200 mesh	3.50
Knoxville, Tenn.—Analysis, 52% CaCO <sub>3</sub> ; 36% MgCO <sub>3</sub> ; 80% thru 100 mesh, bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% CaCO <sub>3</sub> , 2% MgCO <sub>3</sub> ; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% CaCO <sub>3</sub> ; 90% thru 50 mesh	5.00
Olive Hill, Ky.	2.00

## Agricultural Limestone (Crushed)

Bedford, Ind.—Analysis, 98% CaCO <sub>3</sub> ; ½% MgCO <sub>3</sub> ; 90% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Chico and Bridgeport, Texas—Analysis, 95% CaCO <sub>3</sub> ; 1.3% MgCO <sub>3</sub> ; 90% thru 4 mesh	1.00
Colton, Calif.—Analysis, 95-97% CaCO <sub>3</sub> ; 1.31% MgCO <sub>3</sub> , all thru 14 mesh down to powder	3.50
Cypress, Ill.—Analysis, 96% CaCO <sub>3</sub> ; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.20; 50% thru 50 mesh, 90% thru 4 mesh and 50% thru 4 mesh, all	1.10
Davenport, Iowa—Analysis, 92-98% CaCO <sub>3</sub> ; 2% and less MgCO <sub>3</sub> ; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.10
Dubuque, Ia.—Analysis, 34.96% CaCO <sub>3</sub> ; 59.62% MgCO <sub>3</sub> ; 90% thru 4 mesh	.95
Fort Spring, W. Va.—Analysis, 90% CaCO <sub>3</sub> ; 3% MgCO <sub>3</sub> ; 50% thru 100 mesh	1.50
Gibsonburg, Ohio—90% thru 10 mesh	1.00-1.50
Hillsville, Penn.—Analysis, 94% CaCO <sub>3</sub> , 1.40% MgCO <sub>3</sub> ; 75% thru 100 mesh, sacked	5.00
Jamesville, N. Y.—Analysis, 89% CaCO <sub>3</sub> ; 4% MgCO <sub>3</sub> ; 90% thru 100 mesh; in paper bags, 5.10; bulk	3.85
Lannon, Wis.—Analysis, 54% CaCO <sub>3</sub> , 44% MgCO <sub>3</sub> ; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh... 90% thru 50 mesh	3.00
90% thru 4 mesh	2.00
90% thru 4 mesh	1.00
McCook and Gary, Ill.—Analysis, 60% CaCO <sub>3</sub> , 40% MgCO <sub>3</sub> ; 90% thru 4 mesh	.80
Olive Hill, Ky.—50% thru 4 mesh	1.00
Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags	3.50
Stolle and Falling Springs, Ill.—Analysis, 89.9% CaCO <sub>3</sub> , 3.8% MgCO <sub>3</sub> ; 90% thru 4 mesh	1.15-1.70
Stone City, Iowa—Analysis, 98% CaCO <sub>3</sub> ; 50% thru 50 mesh	.75
West Stockbridge, Mass.—Analysis, 95% CaCO <sub>3</sub> ; 90% thru 100 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth	3.50
5.25	
Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh	2.10
*Less 25c cash 15 days.	

## Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% CaCO <sub>3</sub> ; 2% and less MgCO <sub>3</sub> ; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Hillsville, Penn., sacks, 5.10; bulk	3.50
Joliet, Ill.—Analysis, 50% CaCO <sub>3</sub> ; 44% MgCO <sub>3</sub> ; 90% thru 200 mesh (bags extra)	3.50
Rocky Point, Va.—Analysis, 97% CaCO <sub>3</sub> ; 75% MgCO <sub>3</sub> ; 85% thru 200 mesh, bulk	2.25-3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.00

## Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Bags	Lump lime In bulk	In bbl.
<b>EASTERN:</b>								
Berkeley, R. I.								
Buffalo, N. Y.				12.00				
Knickerbocker, Devault, Cedar Hollow and Rambo, Penn.*		9.50	9.50	9.50	8.00	9.50	8.50	
Lime Ridge, Penn.			8.75		6.50	8.00 <sup>3</sup>	5.00	
<b>CENTRAL:</b>								
Afton, Mich.						10.75	7.50	
Carey, Ohio	9.50	6.50	6.50		8.00		8.00	
Cold Springs, Ohio		7.75	7.75				7.50	
Gibsonburg, Ohio	10.50		7.75		7.00	9.00 <sup>9</sup>	7.50	
Huntington, Ind.		6.50	6.50					
Little Rock, Ark.		14.40		14.40			11.90	
Marblehead, Ohio		6.50	6.50				7.00	
Milltown, Ind.		7.50-8.50		8.25-9.25	7.00 <sup>5</sup>	9.25 <sup>6</sup>	6.50 <sup>7</sup>	
Scioto, Ohio	10.50	7.50	7.00	8.00			7.00	15.00
Sheboygan, Wis.		10.50	10.50	10.50			9.50	
Tiffin, Ohio					8.00	10.00		
Wisconsin points		11.50					9.50	
Woodville, Ohio	10.50	7.75	7.75	11.50 <sup>24</sup>	7.00	9.00 <sup>9</sup>	7.00	
<b>SOUTHERN:</b>								
Cartersville, Ga.		9.00				13.50		15.00
Graystone, Ala.*	12.50	9.00		12.50			7.50	
Keystone, Ala.		9.00	9.00	10.00			7.00	
Knoxville, Tenn.	18.00	9.00	9.00	7.50	6.00	1.25 <sup>10</sup>	6.00	
Ocala, Fla.		11.00						
Pine Hill, Ky.		9.00	8.00	9.00			6.00	12.50
<b>WESTERN:</b>								
Kirtland, N. M.							12.00	29.00
Los Angeles, Calif.								12.00
San Francisco, Calif.	19.00	14.00-17.00	12.50	14.00-19.00	14.50 <sup>20</sup>		11.00 <sup>19</sup>	
San Francisco, Calif.†	20.00	16.00	12.00	20.00	16.00		16.00	

<sup>1</sup>Also 6.00. <sup>2</sup>To 1.35. <sup>3</sup>In 100-lb. bags. <sup>5</sup>To 7.50. <sup>6</sup>To 9.75. <sup>7</sup>To 7.00. <sup>9</sup>In 80-lb. paper. <sup>10</sup>Per bbl. <sup>19</sup>Less credit for return of empties. <sup>20</sup>To 14.50. <sup>24</sup>Also 13.00. <sup>25</sup>Superfine, 92.25% thru 200 mesh. \*Price to dealers. †Wood-burnt lime.

## Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

## Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 94% thru 300 mesh, 7.00 per ton in paper bags.

## Slate Granules

Esmont, Va.—Blue, \$7.50 per ton. Granville, N. Y.—Red, green and black, \$7.50 per ton.  
 Pen Argyl, Penn.—Blue-black, 6.50 per ton in bulk, plus 10c per bag.

## Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	1/4-in.	5/16-in.	3/8-in.	1/2-in.	1-in.
Arvon, Va.—Buckingham oxford grey..	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear.....	10.50-14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon.....	9.00-10.25	20.00	24.50	29.00	40.00	51.25
Gen. Bangor No. 2 ribbon.....	6.75-7.25					
Gen. Bangor mediums.....	9.50-11.25					
Chapman Quarries, Penn.—No. 1.....	9.25-11.25					
Medium.....	7.75-9.00	16.00	23.00	26.00	32.00	40.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray.....	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green.....	21.00	24.00	30.00	36.00	48.00	60.00
Red.....	27.50	33.50	40.00	47.50	62.50	77.50
Momson, Maine.....	19.80	24.00				
<b>Pen Argyl, Penn.*</b>						
Graduated slate (blue).....		16.00	23.00	27.00	37.00	46.00
Graduated slate (grey).....		18.00	25.00	29.00	39.00	48.00
Color-tone.....	11.50-12.50; Vari-tone, 12.00-13.00; Cathedral gray, 14.00-15.00					
No. 1 clear (smooth text).....	7.25-10.50; No. 1 clear (rough text), 8.25-9.50					
Albion-Bangor medium.....	8.00-9.00; No. 2 clear, 8.00-9.00; No. 1 ribbon, 8.00-8.50					
<b>Slatedale and Slatington, Penn.—</b>						
Genuine Franklin.....	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1.....	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear.....	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear.....	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.

(b) Prices other than 3/16-in. thickness include nail holes.

(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to \$1.25 per square.

\*Unfading grey, 14.00-15.00; 10% disc. to roofer; 10%-8 1/4% to wholesaler.

## Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:	
Crude talc, per ton.....	5.00
Ground talc (20-50 mesh), bags.....	6.50
Ground talc (150-200 mesh), bags.....	9.00
Pencils and steel crayons, gross.....	1.50-2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99.99% thru 200 mesh, 8.00-8.50; Grade B, 97-98% thru 200 mesh.....	7.50-8.00
1.00 per ton extra for 50-lb. paper bags; 166 2/3-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Crude talc, per ton.....	4.00
Ground talc (150-200 mesh), in bags.....	12.00
Conowingo, Md.:	
Crude talc, bulk.....	4.00
Ground talc (150-200 mesh), in bags.....	14.00
Cubes, blanks, per lb.....	.10
Emeryville, N. Y.:	
Ground Talc (200 mesh), bags.....	13.75
Ground talc (325 mesh), bags.....	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh) in 200-lb. bags.....	15.50-20.00
Henry, Va.:	
Crude (mine run).....	3.50-4.50
Ground talc (150-200 mesh), bags.....	6.25-14.00
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California white.....	30.00
Southern white.....	20.00
Illinois talc.....	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags.....	15.00-60.00
Crude talc, f.o.b. mine.....	8.00-12.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags.....	10.00-15.00

## Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

## Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-72%... 3.75-4.25  
 Mt. Pleasant, Tenn.—B.P.L. 76-78%... 6.75

## Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65-70%... 3.75-4.30  
 Mt. Pleasant, Tenn.—Lime phosphate:  
 B.P.L. 73%... 11.20-13.00  
 Mt. Pleasant, Tenn.—B.P.L., 72%... 5.00-5.50

## Florida Phosphate

(Raw Land Pebble)  
(Per Ton)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L. ....	3.15
70% minimum B.P.L. ....	3.75
72% minimum B.P.L. ....	4.25
75/74% B.P.L. ....	5.25
77/76% B.P.L. ....	6.25

## Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton.....	100.00-125.00
Punch mica, per lb.....	.06
Scrap, per ton, carloads.....	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton.....	120.00-200.00
Mine scrap.....	22.50
Mine run.....	325.00
Clean shop scrap.....	25.00
Roofing mica.....	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 42.50; 100 mesh, 45.00; 200 mesh....	60.00

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board— 3/4x32x36" Per 6'-10" Per	Wallboard, 3/4x32 or 48" Lengths Per 6'-10" Per
Acme, Tex.	1.50-3.00	4.00	4.00	4.00-6.00	4.00-6.00	4.00-6.00	10.00	10.00	19.00	19.00	10.50	12.00
Blue Rapids, Kan.	1.50-3.00	4.00	4.00	4.00-6.00	4.00-6.00	4.00-6.00	10.00	10.00	19.00	19.00	10.50	12.00
Centerville, Iowa			6.00	7.00		7.50	8.50	10.50a				
East St. Louis, Ill.—Special												
Fort Dodge, Iowa.....	2.50	6.00	6.00	7.00	9.00	9.00d	11.50	8.00	16.00	20.00	15.00	25.00
Grand Rapids, Mich.....					9.00d	9.00d		8.00d		21.00d		25.00
Los Angeles, Calif. (b).....		7.00-9.00	7.00-9.00	7.50-9.00	8.00-10.00		8.00-10.00		30.00c			
Medicine Lodge, Kan.....	1.40						11.50d		16.00d	11.50d		
Portland, Colo.....		7.00	7.00	9.00		9.50	9.00		27.50		27.50	
Providence, R. I. (x).....				12.00-13.00e								
Seattle, Wash. (z).....	6.00	9.00	9.00	13.00								
Winnipeg, Man.....	5.00	5.00	7.00	13.00	14.00	14.00					20.00	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, 3/4x32x36-in., 14c-17c per sq. ft.; 3/4x32x36-in., 15c-18c per sq. ft. (c) To 40.00. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," 3/4x48-in. by 5 and 10 ft. long. (g) 3/4x48-in. by 3 to 4 ft. long. (x) "Fabricaste" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7 1/4c-8 1/4c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00. (z) Gypsum partition tile, 3-in., 9c per sq. ft., 4-in., 11c per sq. ft.

## Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink, #12.50-#14.50	#12.50-#14.50	#12.50-#14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags, bulk, per ton		7.50
Crown Point, N. Y.—Mica Spar	#9.00-#12.00	
Davenport, Iowa—White limestone, in bags, per ton	#6.00	#6.00
Harrisonburg, Va.	12.50-14.50	
Middlebrook, Mo.—Red		20.00-25.00
Middlebury, Vt.—Middlebury white	#9.00-#10.00	
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00-7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00-20.00
Tuckahoe, N. Y.—Tuckahoe white	6.00	
Warren, N. H.		8.00-15.00
Whitestone, Ga.		10.00
†C.L. ‡L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L.		

## Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton

18.00

## Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140 mesh (bulk)

19.00

Keystone, S. D.—Color, white; analysis,  $K_2O$ , 13.25%;  $Na_2O$ , 1.92%;  $SiO_2$ , 63.50%;  $Fe_2O_3$ , .06%;  $Al_2O_3$ , 20.10%; pulverized 99% thru 200 mesh, in bags, 17.50; bulk

16.50

Crude, in bags, 9.50; bulk

8.50

Coatesville, Penn.—Color, white; analysis,  $K_2O$ , 12.30%;  $Na_2O$ , 2.86%;  $SiO_2$ , 66.05%;  $Fe_2O_3$ , .08%;  $Al_2O_3$ , 18.89%; crude, per ton

8.00

Erwin, Tenn.—White; analysis,  $K_2O$ , 10%;  $Na_2O$ , 2.75%;  $SiO_2$ , 68.25%;  $Fe_2O_3$ , .10%;  $Al_2O_3$ , 18.25%; pulverized 98% thru 200 mesh, in bags, 17.20; bulk

16.00

Crude, in bags, 8.50; bulk

7.50

Rumney and Cardigan, N. H.—Color, white; analysis,  $K_2O$ , 8.13%;  $Na_2O$ , 1.1%;  $SiO_2$ , 62.68%;  $Al_2O_3$ , 17.18%; crude, bulk

7.00-7.50

Rumney Depot, N. H.—Color, white; analysis,  $K_2O$ , 8.13%;  $Na_2O$ , 1.1%;  $SiO_2$ , 62.68%;  $Al_2O_3$ , 17.18%; crude, bulk

7.00-7.50

Spruce Pine, N. C.—Color, white; analysis,  $K_2O$ , 10%;  $Na_2O$ , 3%;  $SiO_2$ , 68%;  $Fe_2O_3$ , 0.10%;  $Al_2O_3$ , 18%; 99½% thru 200 mesh; pulverized, bulk (Bags, 15c extra.)

18.00

## Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.

2.00

Grand Rapids, Mich.—Drain tile, per 1000 ft. 4-in.

36.00

5-in.

48.00

6-in.

66.00

8-in.

100.00

10-in.

150.00

12-in.

210.00

Longview, Wash.—Drain tile, per 100 ft. 3-in.

5.00

4-in.

6.00

6-in.

10.00

8-in.

15.00

Tacoma, Wash.—Drain tile, per 100 ft. 3-in.

4.00

4-in.

5.00

6-in.

7.50

8-in.

12.00

## Chicken Grits

Centerville, Iowa

9.25

Belfast, Me.—(Agstone), per ton, in carloads

10.00

Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per ton

10.00

Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each

8.00

Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags

12.00

Davenport, Iowa—High calcium carbonate limestone, in bags L.C.L., per ton

6.00

El Paso, Texas—(Limestone) per 100-lb. sack

.75

Los Angeles, Calif.—Per ton, including sacks: Gypsum

7.50-9.50

Middlebury, Vt.—Per ton (a)

10.00

Randville, Mich.—(Marble), bulk

6.00

Seattle, Wash.—(Gypsum), bulk, ton

10.00

Warren, N. H.

8.50-9.50

Waukesha, Wis.—(Limestone), per ton

7.00

West Stockbridge, Mass.

17.50-19.00

Wisconsin Points—(Limestone), per ton (a) F.o.b. Middlebury, Vt. †C.L. ‡L.C.L.

15.00

## Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton Wis.

10.50

Dayton, Ohio

12.50-13.50

Detroit, Mich. (d)

13.00-16.00\*b

Farmington, Conn.

16.00

Grand Rapids, Mich.\*

14.00-15.00

Jackson, Mich.

13.00

Madison, Wis.

12.50a

Mishawaka, Ind.

11.00

Milwaukee, Wis.

13.00\*

Minneapolis, Minn.

10.00\*

New Brighton, Minn.

8.00

Pontiac, Mich.

15.50

Portage, Wis.

15.00

Rochester, N. Y.

19.75

Saginaw, Mich.

13.50

San Antonio, Texas

12.50

Sebewaing, Mich.

12.50

South St. Paul, Minn.

9.00

Syracuse, N. Y.

18.00-20.00

Toronto, Canada

13.00b

Winnipeg, Canada

15.00

\*Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city. (d) Also 14.00 and 15.50\*. (g) F.o.b. yard.

## Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point

Size 8x8x16

Appleton, Minn.

18.00-20.00

Chicago, Ill., district: 8x8x16. Per 1000

180.00

Chicago, Ill.: 8x 8x16. Each

.21†

8x 8x16. Each

.18b

8x10x16. Each

.26†

8x10x16. Each

.23b

8x12x16. Each

.30†

8x12x16. Each

.27b

Columbus, Ohio

14.00b-16.00†

Forest Park, Ill.

21.00\*

Graettinger, Iowa

.18- .20

Indianapolis, Ind.

.10- .12a

Lexington, Ky.: 8x8x16

a18.00\*

8x8x12

a15.00\*

8x8x16

b15.00\*

8x8x12

b13.00\*

Los Angeles, Calif.: 4x8x12

4.50\*

4x6x12

3.90\*

4x4x12

2.90\*

\*Price per 100 at plant. †Rock or panel face. (a) Face. (b) Plain.

## Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—12x8 exposure, 15x9-in. size, per sq.

9.50-12.00

Detroit, Mich.—5x8x12, per M

67.50

Indianapolis, Ind.—9x15-in. Per sq.

10.00

Gray

11.00

Red

13.00

Green

15.00

Lexington, Ky.—8x15, per sq.:

18.00

## Cement Building Tile

Chicago District (Haydite): 8x 4x16, per 1000

140.00

8x 8x16, per 1000

200.00

8x12x16, per 1000

300.00

Columbus, Ohio: 5x8x12, per 100

6.00

Lexington, Ky.: 5x8x12, per 100

7.50

4x5x12, per 100

4.00

Longview, Wash. (Stone Tile): 4x6x12, per 1000

57.50

4x8x12, per 1000

65.00

## Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	13.00a	
Forest Park, Ill.		37.00
Longview, Wash.	16.50	25.00
Milwaukee, Wis.	14.00	32.00
Omaha, Neb.	17.00	30.00-40.00
Philadelphia, Penn.	15.50	
Portland, Ore.	12.00	22.50-55.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00-40.00

(a) Delivered on job; 10.00 f.o.b. plant.

## Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points.

16-30 mesh	20.00
30-60 mesh	22.00
60-100 mesh	18.00
100 mesh and finer	9.00

Note—Bags extra and returnable for full credit.

## Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. \*Delivered on job. †10% disc.

## Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Culvert and Sewer																	
Grand Rapids Mich. (b)					.57	.93	1.20										
Indianapolis, Ind. (a)					.75	.90	1.15										
Newark, N. J. (d)					.85	.95	1.25	1.40	1.56								
Norfolk, Neb. (b)					.90	1.00	1.13	1.42									
Tiskilwa, Ill. (rein.)					.75	.85	.95	1.20	1.60								
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	.70										
Wahoo, Neb. (c)					.85½		1.14										

(a) 24-in. lengths. (b) Culvert; 21-in., 1.43. †21-in. diameter. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced.

## Sand-Lime Brick Production and Shipments in March

THE following data are compiled from reports received direct from 18 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is three less than those furnishing statistics for the February estimate, published in the March 15 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

With the opening up of the spring work, production shows a marked increase over the figures for February, although three plants still reported no production for the month. Shipments both by rail and truck showed a good increase, as did stocks on hand, and of course the added demand increased the amount of unfilled orders.

The following are average prices quoted for sand-lime brick in March:

Shipping Point	Plant Price	Delivered
Atlantic City, N. J.	\$12.00	\$17.50
Boston, Mass.	11.00	15.00
Dayton, Ohio	12.00	15.00@15.50
Detroit, Mich.	\$13.00	14.00 15.00@16.00
Detroit, Mich.		15.50@16.00
Grand Rapids, Mich.		14.50
Jackson, Mich.	13.00	
Menominee, Mich.	11.00	13.50
Milwaukee, Wis.	10.50	13.00
Minneapolis, Minn.	9.00	
Mishawaka, Ind.	11.00	
Saginaw, Mich.	12.00	
Syracuse, N. Y.	18.00	20.00
Toronto, Can.	11.00	13.00
Winchester, Mass.		16.00

The following statistics are compiled from data received from 18 producers in the United States and Canada:

### Statistics for February and March

	*February	†March
Production	4,827,000	7,406,000
Shipments (rail)	2,489,000	2,846,000
Shipments (truck)	3,576,000	4,814,000
Stocks	10,286,000	11,449,000
Unfilled orders	9,358,000	12,793,000

\*Revised to include one plant not reporting in statistics published in March 15 issue. Twenty-one plants reporting. Incomplete, one plant not reporting production, three not reporting stocks on hand, and nine not reporting unfilled orders.

†Eighteen plants reporting. Incomplete, one plant not reporting production, one not reporting stocks on hand, and six not reporting unfilled orders.

## The \$50,000,000 Extra for Roads Allotted

### SECRETARY OF AGRICULTURE

Arthur M. Hyde, today apportioned among the 48 states and Hawaii the sum of \$48,750,000 of the additional \$50,000,000 authorized by congress as federal aid for highway construction in the fiscal year beginning July 1, 1930. This supplementary appropriation for federal-aid highways was authorized by the bill signed by President Hoover on April 4, which also authorized the appropriation of \$125,000,000 for each of the fiscal years 1932 and 1933.

The additional \$50,000,000 brings the authorized appropriation for 1931 to \$125,000,000. Congress provided \$75,000,000 by a previous act, and Secretary Hyde apportioned this among the States and Hawaii on December 2, 1929.

All apportionments of federal funds for highways in the federal-aid system are based on the area, population and post road mileage of the States, and the share of each state is available for expenditure on roads included in the federal-aid system under the joint supervision of the state highway departments and the Bureau of Public Roads of the U. S. Department of Agriculture. Apportionment of the 1932 authorization will be made on or before January 1, 1931, and of the 1933 authorization on or before January 1, 1932.

A tabulation of the apportionment to the states as certified by the secretary of agriculture, of both the original \$75,000,000 authorization and the additional \$50,000,000 for the fiscal year 1931 follows:

### APPORTIONMENT OF FEDERAL AID TO THE STATES

	(Fiscal Year 1931) Apportionment of original authorization of \$75,000,000	Apportionment of additional \$50,000,000 authorization
Alabama	\$1,557,372	\$1,038,248
Arizona	1,062,190	708,127
Arkansas	1,293,086	862,057
California	2,501,170	1,667,447
Colorado	1,390,524	927,016
Connecticut	477,893	318,596
Delaware	365,625	243,750
Florida	921,558	614,372
Georgia	1,985,632	1,323,755
Idaho	932,594	621,729
Illinois	3,100,781	2,067,187
Indiana	1,909,505	1,273,003
Iowa	2,005,944	1,337,296
Kansas	2,048,585	1,365,723
Kentucky	1,414,610	943,073
Louisiana	1,040,195	693,463
Maine	675,106	450,071
Maryland	631,911	421,274
Massachusetts	1,090,022	726,682
Michigan	2,200,177	1,466,785
Minnesota	2,102,986	1,401,991
Mississippi	1,323,897	882,598
Missouri	2,382,383	1,588,255
Montana	1,552,865	1,035,243
Nebraska	1,586,526	1,057,684
Nevada	960,845	640,563
New Hampshire	365,625	243,750
New Jersey	936,234	624,156
New Mexico	1,190,296	793,531
New York	3,605,965	2,403,976
North Carolina	1,722,673	1,148,449
North Dakota	1,203,060	802,040
Ohio	2,753,528	1,835,685
Oklahoma	1,751,015	1,167,343
Oregon	1,197,667	798,445
Pennsylvania	3,314,707	2,209,805
Rhode Island	365,625	243,750
South Carolina	1,065,105	710,070
South Dakota	1,232,962	821,975
Tennessee	1,608,802	1,072,535
Texas	4,545,830	3,030,554
Utah	850,752	567,168
Vermont	365,625	243,750
Virginia	1,429,253	952,835
Washington	1,156,219	770,812
West Virginia	792,826	528,550
Wisconsin	1,849,169	1,232,780
Wyoming	942,455	628,303
Hawaii	365,625	243,750

## Gravel Royalty of 15 Cents Per Cu. Yd.

THE city council of Brazil, Ind., has voted unanimously to award to the Brazil Sand and Gravel Co. a lease to take out sand and gravel from 2.9 acres of land owned by the city which lies on the east side of the water works road north of the old hill cemetery.

The lease specifies that the company must pay 15 cents for each cubic yard of sand and gravel taken out. The city's share in royalties is estimated at \$25,000.

The lease is drawn up for a period of five years with the privilege of a two-year extension if necessary. According to provisions in the terms of the lease the company is to use the surface material for the construction of a dam along the water works road for the emponding of a large body of water. The lease also specifies that the company shall drill and equip two wells for the city as two of the old wells are giving out, the cost of which will be returnable from royalties on sand and gravel due the city. Work on the new pit will start soon, as the new lease becomes effective at once.—*Brazil (Ind.) Times.*

## Recent Pacific Coast Bids on Portland Cement

BIDS recently offered the city of Portland, Ore., on 5000 bbl. of portland cement are reported to have been \$2.80 per bbl., 10c. per bbl. discount for 30 days. The companies submitting the bids were: Oregon Portland Cement Co., Pacific Portland Cement Co., Nottingham and Co., Beaver Portland Cement Co., and the Santa Cruz Portland Cement Co.

Bids received recently by Los Angeles County, California, for portland cement for the Hanson dam are reported to have been: Riverside Cement Co., \$1.85 per bbl.; California Portland Cement Co., \$1.94 per bbl.; Southwestern Portland Cement Co., \$1.94 per bbl.; Monolith Portland Cement Co., \$1.86 per bbl.

## A New Wisconsin Gravel Producer

THE Edgerton Sand and Gravel Co., has bought about 21 acres of land from the Edgerton Stock Yards Co., Edgerton, Wis., and Charles V. Sweeney has bought the stock holdings that the Edgerton Stock Yards Co. had in the Edgerton Sand and Gravel Co. The land purchased includes the gravel pit.

The Edgerton Sand and Gravel Co. has been incorporated, the officers being Frank Lipke, president and manager; Richard Miller, vice-president, and Fred Lipke, secretary and treasurer.

## William H. McKelvey

WILLIAM H. MCKELVEY, formerly mill superintendent for the Alpha Portland Cement Co., died suddenly at Easton, Penn., on March 31 at the age of 48. A graduate of Princeton, Mr. McKelvey joined the Alpha sales force in 1900, and later was made superintendent of the Manheim, W. Va., and Catskill, N. Y., plants of the company. His brother, Frank G. McKelvey, a vice-president of the company, survives.

# Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

## Manufacture of Art Objects of Colored Cement

### Part V—Color Cement Objects with Metal Inserts

By George Rice  
Palo Alto, Calif.

THE REINFORCING of cement tile and other objects with wire cloth, iron braces and various types of metal supports is common. But the employment of metal forms and figures to build a design in a cement base is something of a specialized art. Yet it can be accomplished as readily with metal mosaics as with glass mosaics. In fact, iron mosaics promise to be as much in vogue as any other kind of mosaic that depend upon cement for a ground. It is possible to produce many artistic effects in cement tile with the metal embellishments set in intaglio fashion. That is, the cement ground is cut into and the molten metal is run into the cuts which are, of course, below the surface of the tile. In some instances the tile is engraved with the excavations to fit the shape of the hard metal pieces which are simply dropped in while the cement is still soft. Then with a trowel the edges of the intaglio cuts are pressed slightly over the

edges of the metal figures so as to lock the latter in when the cement hardens.

The process involves the use of a clay model, as shown in Fig. 1. While almost any kind of clay will do, it is best to buy the standard modeling clay from dealers, for this will be the proper fineness and possess the right qualities for modeling purposes. Any kind of designs can be cut into the soft clay with tools and from this clay model a

easily melted are thus possible. A finished tile is shown in Fig. 3. The black represents the metal which has been placed in it in a

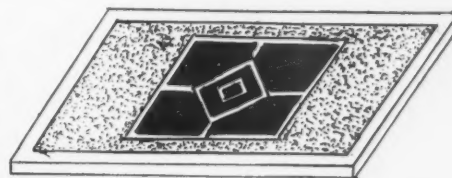


Fig. 3. A finished tile

solid or melted state. A great amount of wire cloth is used for reinforcing tile work as shown in Fig. 4. To reinforce a tile in this way cut the wire cloth the right size and drop it into the cement backing of the tile before the cement has hardened. Sometimes an additional layer of cement is poured over the wire cloth, thereby concealing it and also adding to the strength of the tile.

(To be continued)

### Ready-Mixed Concrete Approved by City Inspection Bureau

WARNER Co., Philadelphia, Penn., has received from the Philadelphia Bureau of Building Inspection official approval of the company's ready-mixed concrete for use in building construction in Philadelphia.

Action by the bureau is the result of exhaustive tests made under its supervision and is contingent upon compliance with certain definite requirements laid down by the bureau. In these tests the bureau was represented by George Warner, concrete engineer, and Prof. H. L. Berry of the University of Pennsylvania. The tests were made in the construction of a building especially designated for this purpose.

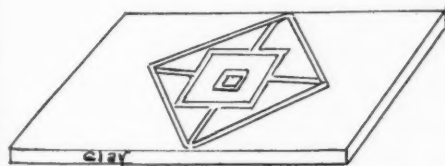


Fig. 1. Clay model for casting the plaster mold

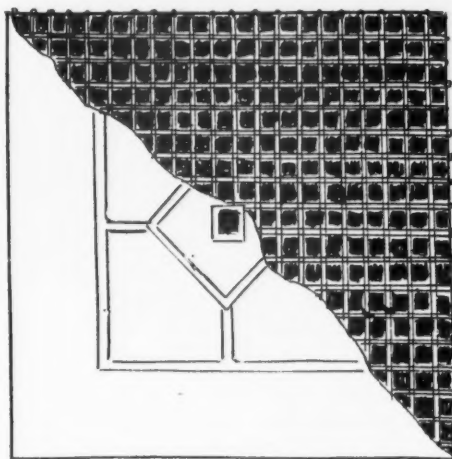


Fig. 4. Wire cloth used as reinforcing backing for cement tile

plaster mold is made, if any great number of tiles is to be cast.

If only a few tiles are required the clay model will do and this is placed in a mold and the cement which has been mixed to the right consistency for pouring is put in and allowed to harden. In this way we get a cement tile in readiness for placing previously shaped metal mosaics in the depressions, or shaping the metal according to the lines of the depressions by pouring the metal in a molten state as shown in Fig. 2. Effects in lead or with the metals that are

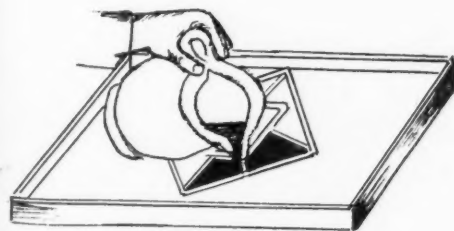


Fig. 2. Melted lead is poured into the mold on to the clay model and the result used for making the cement tiles

# Ready-Mixed Concrete

## Certified Compressive Strength Versus Workability

By L. C. Hill  
Jacksonville, Fla.

**I**S THE selling of a certified compressive strength concrete blinding us to the more important factor, which is workability? It is the author's belief that the mix should not be governed entirely by the required or specified compressive strength.

The success of ready-mixed concrete plants depends not on "high pressure" salesmanship but on co-operation with the contractors. This will make it necessary to furnish an engineering service that will assure complete satisfaction to the owner, architect or engineer as well as the contractor.

Under no circumstances should an order be filled until the plant has complete information regarding the exact requirements of the mix. A common fault and one of the greatest objections to ready-mixed concrete by engineers and architects is a stiff, under-sanded mix.

While it is not impossible to place a stiff and slightly under-sanded mix, it calls for a so-called "human factor," as the inspector or supervising engineer must almost come to blows with the contractor in order to have the concrete sufficiently spaded.

Just put yourself in the inspector's shoes; the poor devil is up there on the forms sweating blood, as the success or failure of the job, probably involving thousands of dollars and his reputation which took a lifetime to build, depends on that mix and his ability to place it.

The author will admit that a slightly over-sanded mix requires an excess of mixing water, thus increasing the water-cement ratio, which in turn decreases the compressive strength. But on the other hand, sand is as a rule, in most localities, the cheapest ingredient entering the mix; and even if it required an additional amount of cement it would be the cheapest mix in the end.

Such a mix cannot only be placed with a minimum of spading but saves a great deal of patching and rubbing and produces a much more presentable and workmanlike piece of work on completion, in addition to eliminating that dangerous and disagreeable human factor.

The ready-mixed concrete game has wonderful possibilities, but cut-throat competition and lack of co-operation among the plants are making it a tough game in many localities.

Your salesman, or let's say "Service Man," should not only be very familiar with his "Concrete," but the design of forms, efficient methods of placing, etc., in addition to having a general knowledge of the building game as a whole. In other words, when he can give the contractor this valuable service,

it will not require so much salesmanship. Remember, "He who serves best, serves longest."

## Old Foundry Buildings to House Ready-Mix Concrete Plant

**T**HE Westchester Certified Mixed Concrete Co., Port Chester, N. Y., has completed negotiations for the purchase of the old Bent foundry property at the river end of Purdy avenue, officials of the concern announced today.

Purchase of the old foundry property, which for 18 years or more had been owned by the Russell, Burdell and Ward Bolt and Nut Co., was made through John Macri, vice president of the concrete company.

The land involved in the sale is the big feature of the purchase, there being 573 ft. of frontage on the harbor extension of the Byram river, giving the concrete company perhaps Port Chester's largest marine shipping site. On the property is also a large brick building which will be completely renovated for use as a storage house and office building.

Arrangements have been made for a survey of the building, for the immediate installation of machinery for the production of ready-mixed concrete. Orders have also been given for six trucks with special bodies containing revolving drums, in which deliveries of the firm's product will be made.

It is planned to use approximately 300 ft. of the land fronting on the river for dock and loading purposes. The remainder of this property as well as property on Milton harbor, which the company owns, will be put into the market for sale or lease.—*Port Chester (N. Y.) Item.*

## Expanding the Products Market Through Color

**M**EMBERS of the Iowa Concrete Products Association were urged to consider seriously the possibility of colored concrete products as a means of expanding their markets, in a paper at that association's convention, by G. B. Smith. The prediction was made that the demand for colored products would develop rapidly in the next few years and products manufacturers should be alert to the opportunity, the speaker said.

## Selling More Concrete Products

**C**ONSISTENT advertising by suitable mediums is a sales stimulus for concrete products, according to L. R. Fairall, presi-

dent of Fairall and Co., advertising specialists, Des Moines, Iowa, in a recent address before the Iowa Concrete Products Association. Preparation of attractive booklets, well distributed among possible users, was one of the ways by which sales could be increased, he declared. The industry needed, he concluded, more sound and scientific advertising if it were to gain its rightful place.

## Contractors to Tackle Stabilization of Highway Construction

**E**XTENSION to the highway construction industry of the credit stabilization procedure now being adopted in the building industry will be one of the major subjects up for discussion at the annual spring meeting of the executive board of the Associated General Contractors of America, according to E. J. Harding, assistant general manager of that organization.

The contractor's association maintains that the highway construction industry has long suffered from the overexpansion of contractors, resulting in unsound competitive conditions that have tended to bankrupt the entire industry while preventing the rendering of proper service to the public. The new move for the stabilization of credit practices is designed to set up and maintain standards of business procedure which would aid in preventing contractors from defaulting on highway projects and would eliminate the consequent delays and losses to the public.

Other features of the program of the association to be discussed by the executive board at Washington, D. C., April 28, concern the adoption of prequalification procedure by public bodies whereby the qualifications of a contractor may be determined before he is asked to submit bids, the move to list the past performance records of all contractors in the country through the Bureau of Contract Information, Inc., progress being made in checking the day labor activities of public bodies and the extension of the accident prevention campaign of Associated General Contractors.

The board will also be called upon to lay down policies for the guidance of the many credit bureaus in the building industry which are rapidly being established in response to the joint program of the contractors' organization and the National Builders' Supply Association.

## Imports of Cement Gain in First Two Months

**I**MPORTS of foreign cement for the first two months of 1930 were 316,064, bbl., valued at \$327,178, compared with 270,000 bbl., valued at \$301,099, for the first two months of 1929. The average value of cement imported this year was \$1.04 per bbl. against \$1.12 for the same period in 1929, according to government statistics.

# Some Recent Conveying Equipment

Developments in Material Handling in Other Industries of Interest to Rock Products Operators

TWO RECENT CONVEYOR installations, one in a metallurgical plant and the other in an oil refinery, are of interest to rock products producers who wish to keep posted on material handling in industries where the problems are identical or very similar to their own. The first is an installation of a new and novel type of conveyor—new a year or two ago—a vibrating conveyor; and the other is a strictly up-to-the-minute installation of belt and screw conveyors for handling a dry, fine material.

## Vibrator Conveyor Installation

The vibrator conveyor installation is at the Kellogg, Idaho, smelter of the Bunker Hill and Sullivan Mining and Concentrating Co. It is described in a recent issue of *Engineering and Mining Journal* by A. F. Beasley, smelter superintendent, from which the following data are taken. The conveying problem was the handling of pre-roasted ore from sintering machines for further processing with the least possible dust loss—not unlike the ordinary portland cement clinker handling problem. The accompanying flow sheet shows the scheme adopted.

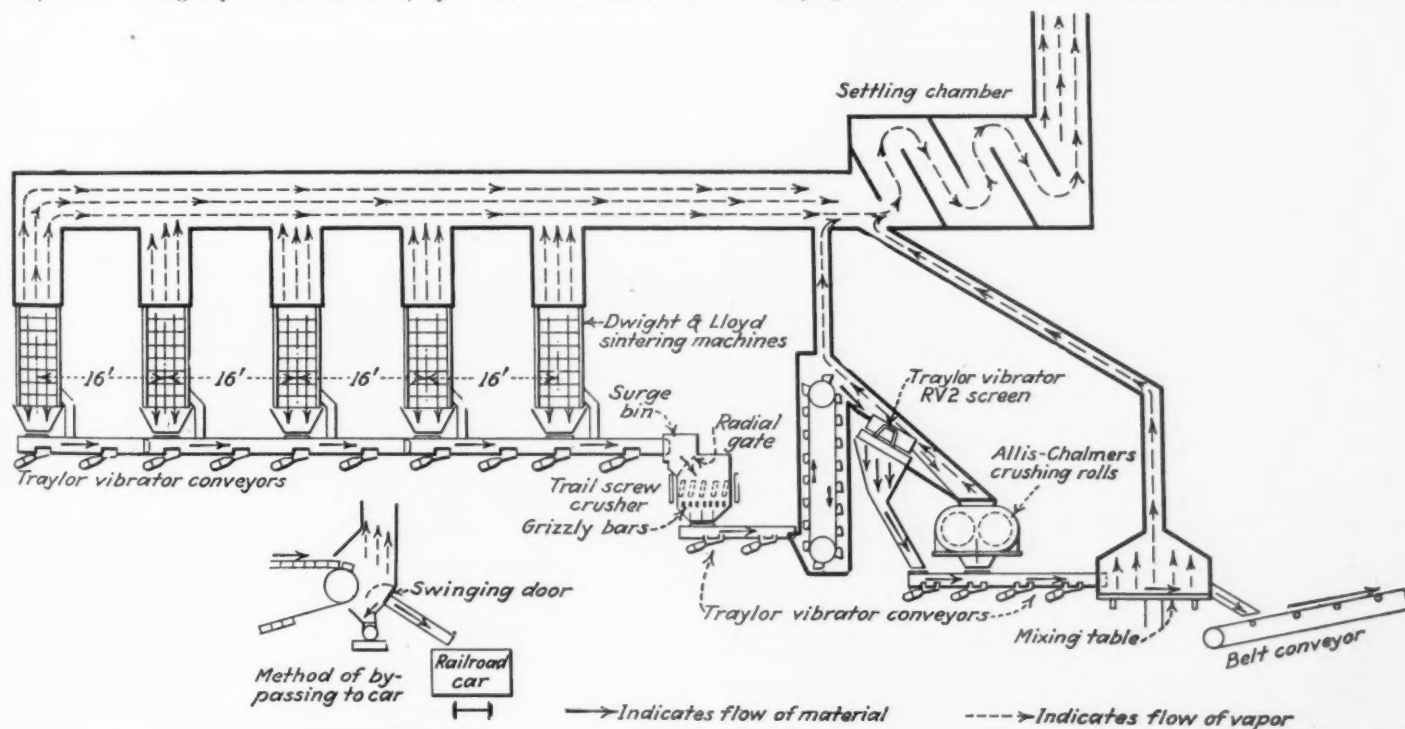
The special discharge hoppers from the sintering machines were designed to meet these requirements: (1) Substantially dust-tight; (2) arranged so that the sinter (clinker) under emergency conditions could, by

opening a gate, be discharged into cars; (3) chimneys or stacks over the sintering machines connected tightly with special discharge hoppers; the tops connected to a common gathering flue, on the end of which is a dust-settling chamber; on top of this chamber a short stack for natural draft.

After a thorough investigation of all types of mechanical conveyors, the Traylor vibrator conveyor, tubular type, was selected for gathering and conveying the sinter. The five sintering machines (Dwight and Lloyd) are 16 ft., c. to c., so 80 ft. of conveyor is necessary for gathering the material. The conveyor is made in three sections, two 32 ft. long and one 16 ft., so arranged that each section discharges into the succeeding section. One of the two 32-ft. sections serves roasters Nos. 1 and 2, the other serving roasters Nos. 3 and 4; the 16-ft. section serves roaster No. 5. The direction of conveying is from roaster No. 5 toward roaster No. 1. These conveyor units, designated as Type CVS6 by the manufacturer, are 26-in. diameter tubes, on which vibrating mechanisms have been clamped. The vibrating mechanisms cause the tube to oscillate along its axis at the rate of 3600 vibrations per minute, the strokes seldom exceeding  $\frac{1}{8}$  in. in length. Vibration is imparted at an angle to the axis, so that as the tube moves forward in the direction of conveying it also

moves upward, and as it moves backward it also moves downward. This causes the material inside the tube to travel along its length at speeds varying from zero to 45 or 50 ft. per minute, depending on the amplitude through which the tube is vibrated. According to the manufacturer, the tube moves forward and backward at the same speed, and conveying is, therefore, not the result of what is commonly known as "differential" or "quick return" motion.

A heavy cast-iron main frame, rectangular in cross-section and about 54 in. long, holds the vibrator units. In the frame is a rectangular hole filled with vibrator bars which are rigidly clamped to the frame at each end by set screws. At the center they are also clamped by a steel casting which is strapped to the tube. The resultant arrangement resembles a multi-leaf spring, so assembled that the bars may flex backward and forward across their normal positions of rest. This flexing causes the tube to move backward and forward. A laminated armature, with a C-shaped stator, is attached to one end of the center steel casting. When the current is applied, the stator attracts the armature, the gap between the face of the armature and the magnet partly closing. This movement is transmitted by the steel casting to the bars, causing them to flex. When the supply of current is cut off

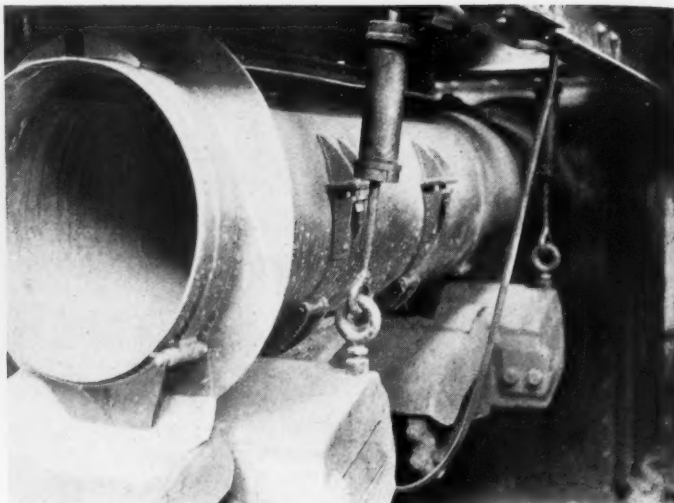


This flow sheet shows how an Idaho smelter conveys pre-roasted ore from sintering machines, not unlike handling of ordinary portland cement clinker

Courtesy of Engineering and Mining Journal



*Side view of vibrating screen*



*Closeup of vibrating conveyor*

or reversed, the bars, having been flexed toward the stator beyond their neutral point, spring back and pass the neutral point in the opposite direction. Power is then applied again to the stator, and the amature is attracted, causing the bars to flex again. This operation takes place 3600 times per minute, as 60-cycle current is employed. The total assembly might, therefore, be described as a synchronous motor of oscillation rather than of rotation. Four of these vibrator units are attached to each 32-ft. section of the 26-in. tube and two to each 16-ft. section.

The conveyor meets a number of rather interesting requirements: no oiling or greasing is necessary; it has no bearings or movable parts, which is a decided asset in the application of the device at a smelting plant; and it is entirely electrical in its operation. Operating power at 440 volts is obtained through a transformer from 2300-volt 3-phase service lines. With the equipment, the manufacturer supplies a small motor-generator set which is so arranged that, by means of a rheostat, the speed of conveying through the tube may be varied at will.

Each of the special dustproof discharge hoppers from the Dwight and Lloyd ma-

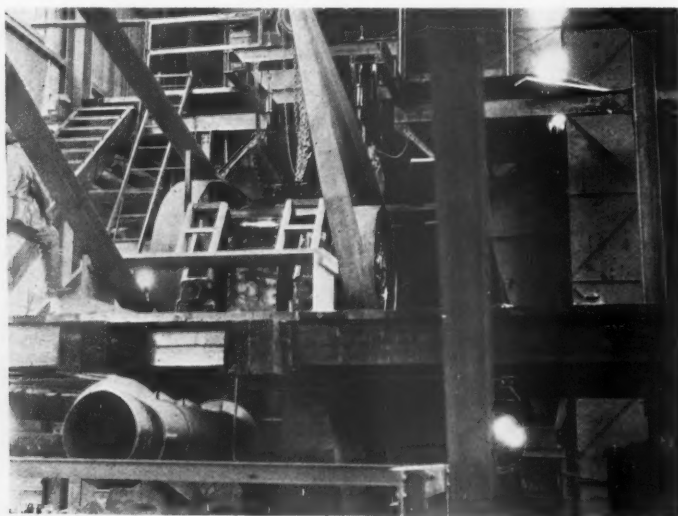
chines has a 16x42-in. opening, the long dimension being parallel to the axis of the tubular conveyor. In the top of the conveyor, and directly under the hopper opening, is an opening of the same size, the space between the two openings being closed by heavy packing. A light channel-iron framework supports the conveyor, which is hung on special shock absorbers to protect it from the vibration of the building.

At the end of the gathering conveyor, which is made up of three sections of 26-in. diameter tubing, is a small surge bin, mounted directly over a screw crusher. This surge bin distributes the feed to the crusher. It is equipped with a radial gate at the bottom, so that the feed to the crusher may be instantly shut off for short periods, during which the roasters are not shut down, the feed accumulating in the bin.

The screw crusher, which was developed at the Consolidated Mining and Smelting Co.'s smelter at Trail, B. C., has long been used at the Bunker Hill smelter with satisfactory results. It consists primarily of a rectangular cast-iron box, the bottom of which is made of grizzly bars. The tops of the grizzly bars are set on a radius from

the center of the shaft on which the screw flight is carried and are parallel to the axis of the shaft. A grizzly grate is also used at the end of the screw flight. The shaft on which the flight is mounted is so arranged on the rear of the crusher that the large flywheel employed gives the flight sufficient inertia to handle peak loads and hard pieces of sinter. In the front or driving end of the shaft is a safety shear pin which is sheared off without damage to the flight or to the machine whenever anything of a non-crushable nature enters the crusher. The grizzly bars at the bottom are set at about 2-in. openings, and the grizzly bars at the end the set closer than this. The machine has ample reserve capacity to cope with heavy surges of feed that occur at times, for example when the pallet from No. 5 roaster arrives under No. 4 roaster just as the pallet from the latter is dropped, then these two pallets arrive under No. 3 roaster as it discharges, and so on until five pallets comprise the surge. These conditions necessitate the use of a flexible crushing device with ample capacity.

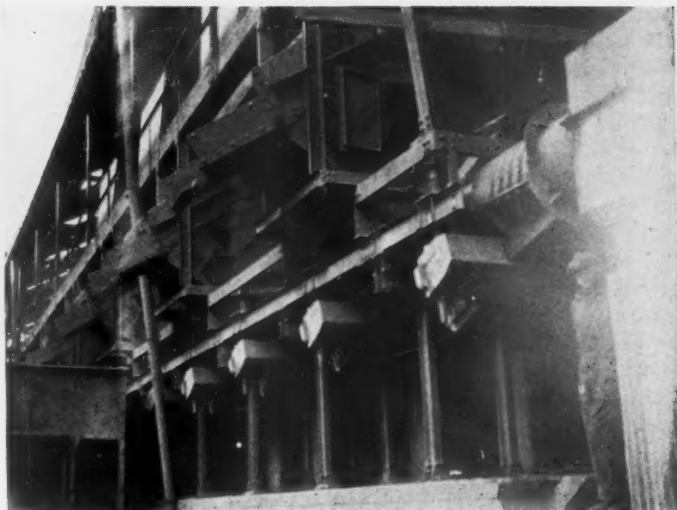
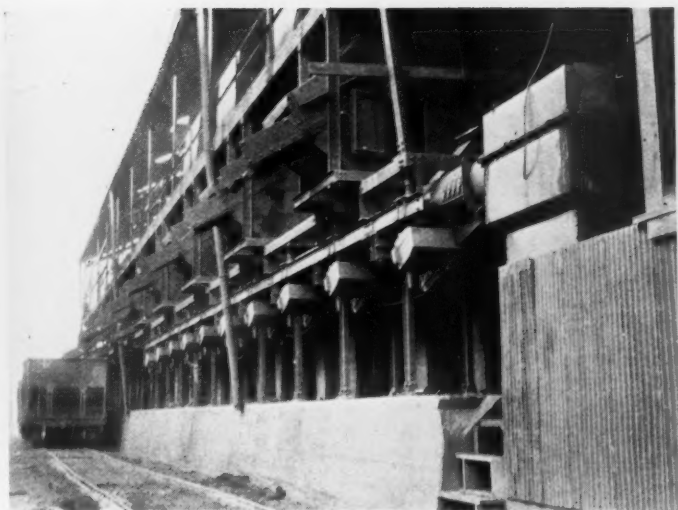
Directly beneath the screw crusher, another Traylor vibrator conveyor is mounted;



*Screen discharge to conveyor*



*General view of Kellogg smelter*



**A view of hoppers and method of by-passing to cars**

this is a tube 20 in. in diameter, made of 10-gage steel, and is operated by a smaller and lighter type of vibrator. The unit is designated by the manufacturer as Type CVS5. This conveyor moves the discharge from the screw crusher 10 ft. horizontally to the boot of a chain elevator, where it is elevated about 40 ft. and discharged through a chute on to a Type RV2 Traylor vibrating screen with  $\frac{5}{8}$ -in. openings. Oversize from the screen passes to a set of Allis-Chalmers rolls. The undersize and roll product enter another Traylor vibrating conveyor, Type CVS5, with a 20-in. diameter tube, 20 ft. 8 in. long. This is so mounted that the undersize product from the screen passes from a chute into the rear end of the conveyor and the discharge from the rolls enters the conveyor at about the middle of its length. The total feed is then conveyed to a mixing table.

The system as arranged simplifies operation procedure, besides facilitating inspection and protecting the health of the workers. All the apparatus is electrically interconnected, so that the failure of any piece of



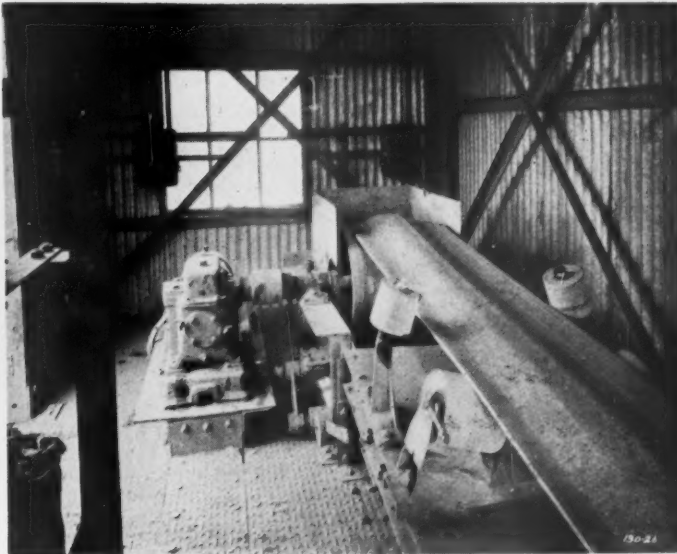
**Tail end of a 16-in. belt conveyor for unloading and storing fullers' earth at the plant of the Kendall Refining Co., Bradford, Penn.**

equipment in the system sounds an alarm. Workers on the lower levels keep in close communication with those on the sintering floor by means of electric signals, so that variations in the feed or shutdowns are instantly communicated from one group to the other. Even when in full operation the plant is remarkably quiet; it requires a minimum of service and attention, and is largely automatic in operation.

#### **Belt and Screw Conveyors for Fullers' Earth**

The second materials-handling installation referred to in the opening paragraph is for handling fullers' earth at the refining plant of the Kendall Refining Co., Bradford, Penn., and the data herewith are from an article in *The Labor Saver* (house organ of the Stephens-Adamson Manufacturing Co.), by H. H. Greene, vice-president and secretary of the Kendall company. The fullers' earth is used for filtering and refining lubricating oils.

New earth comes packed in 135-lb. bags,



**Left, fullers' earth as it is received in box cars and ready to be conveyed into the plant. Right, discharge end of 16-in. conveyor**

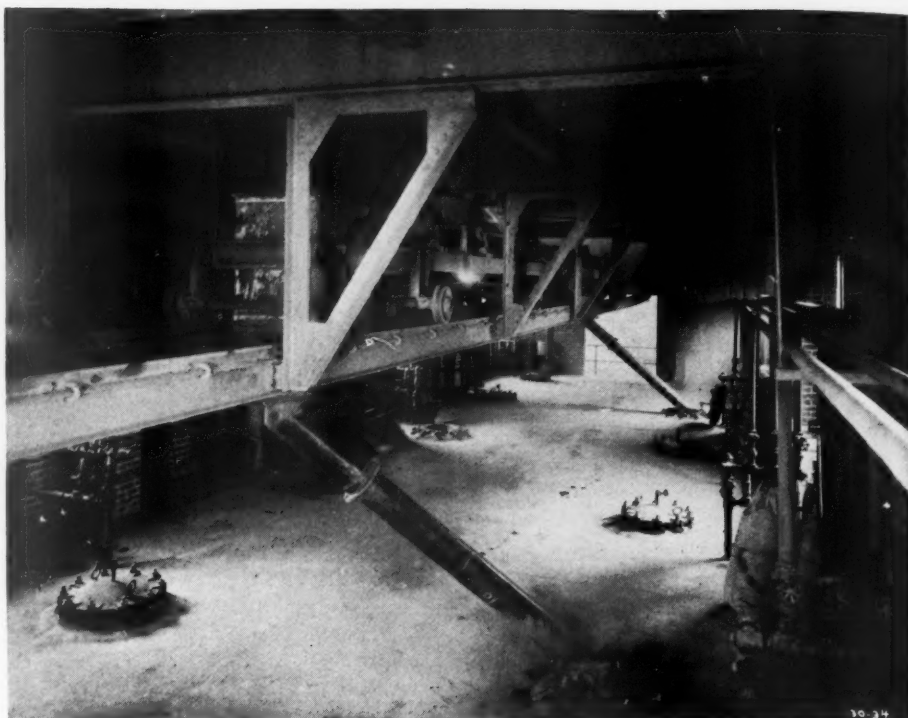
and is dumped from the bags into a hopper, the top of which is level with the box car floor. This flows on a 16-in. by 50-ft. center belt conveyor, which discharges to the steamed earth conveyor, the tail end of which is at one end of the filter house. From this point, new and used earth follow the same course and may be considered collectively.

The bottom of a filter, the fullers' earth of which is ready for burning out the collected carbon, tar, etc., taken from the oil, is opened and the earth discharged into a screw conveyor which travels on rails so as to reach each filter. The earth passes to a 16-in. by 150-ft. belt conveyor which discharges to a bucket elevator 75 ft. high. The 25-ton filters are emptied in less than two hours. The elevator carries the earth to an overhead belt 16 in. by 38 ft., running in a steel and galvanized iron gallery. It discharges the earth into elevated tanks over the burners. By the proper valve arrangement it will flow to one of five tanks. The two burners are fed by gravity from these tanks at the combined rate of 5 tons per hour. These burners are of the Nichols-Herreshoff type.

A bucket elevator picks the earth from the burner outlet and the earth is then elevated 40 ft. and dumped on another 16-in. belt, which carries it overhead, also through an enclosed steel gallery, and places it on a shuttle conveyor. This shuttle moves on rails about 8 ft. above the floor and filter man-head. A spout and valve arrangement allows the earth to be placed in the proper filter.

The entire system has been designed to handle 20 tons per hour. A new addition to the filter plant has added 300 tons of earth capacity to the old capacity of 150 tons.

When the material is received in bulk form in box cars, the usual equipment



*Earth that has been steamed and reclaimed is distributed by this shuttle belt conveyor*

is installation of power unloading shovels which are arranged for discharging the material into hoppers located adjacent to the tracks. Elevators, conveyors and automatic trippers distribute the fullers' earth into storage bins. From these bins the material is reclaimed, elevated and conveyed to the filters.

After the fullers' earth has accomplished its purpose in the filters, it is carried by conveyors operated under the filter tanks to elevators which discharge into special bins.

These special bins are usually located adjacent to rotary kilns. The process in the kilns restores the fullers' earth to its original condition, after which the material is again ready for redistribution either to special storage bins or to the filters.

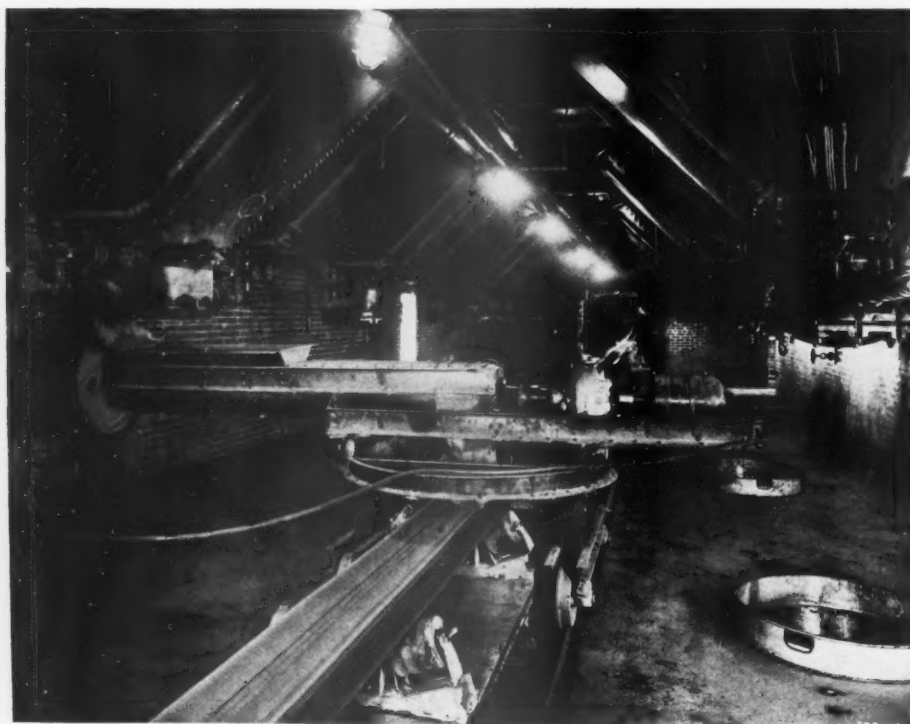
The conveying system described was designed by the Stephens-Adamson Manufacturing Co.'s engineers.

### Use of Lime in Sanitation

THERE are at least seven main uses of lime in sanitation, says A. B. Searle in a recent issue of the *Stone Trades Journal* (England). These he classifies as follows: In the purification of water; the treatment of sewage; treatment of trade refuse and effluents; the disposal or deodorization of garbage; as a disinfectant or absorbent of disinfectant; as a fungicide and insecticide; and various minor uses.

### Coal-Dust Explosibility Factors

TECHNICAL Paper 464, "Coal-Dust Explosibility Factors Indicated by Experimental Mine Investigations, 1911 to 1929," has been recently brought out by the U. S. Bureau of Mines. The purpose of this report is to classify further and summarize the knowledge gained from a large number of tests and from studies following explosion disasters, especially conditions that have contributed to the production of clouds of coal-mine dust and their ignition by various agencies—interesting to users of coal also.



*From filters to burners by movable screw conveyor and belt*

## Consolidated Rock Products Company to Have New President

**E**LECTION of Ford J. Twaits to the presidency of the Consolidated Rock Products Co., Los Angeles, Calif., to succeed George A. Rogers will take place at the next meeting of the directors, it was announced recently. Mr. Twaits, who is executive vice-president of the Consolidated Steel Corp., will occupy the position of general manager until the directors act.

Announcement of this impending change followed the decision of George A. Rogers, former head of the Union Rock Co., until its merger with other units into Consolidated Rock Co., to resign to devote his entire attention to personal business interests. For the last six months Mr. Rogers has been acting general manager, but it was generally understood that his acceptance of the managership was temporary, pending the completion of details growing out of the merger.

At the next regular meeting of the Consolidated Rock Products Co. directors, the executive committee, according to the announcement, will recommend the election of Mr. Twaits as president. Favorable action is regarded as a certainty because of his familiarity with the contracting and building business in southern California.

Mr. Twaits will not, it is understood, sever his connection with the Consolidated Steel Corp. He has been a director of both organizations since their formation, and is expected to function capably as executive vice-president of the steel company and president of the rock concern.

Since the organization in January, 1929, of the Consolidated Steel Corp., Mr. Twaits has served as executive vice-president. Prior to that time he was a partner in the building company of Schofield-Twaits Co.

No date has been fixed for the next meeting of the Consolidated Rock Co. directors.  
—Los Angeles (Calif.) Times.

## Tariff Conferees Agree on Some Rock Products

**A**FEW schedules in the new tariff bill on rock products have already been agreed upon in conferences between the House of Representatives and the Senate. These include:

Chalk or whiting, dry, ground or bolted, 4/10 cent a pound; House rate, 4/10 cent; Senate rate, 25%; chalk or whiting, precipitated, 25%; House, 25; Senate, 25.

Manufactures of carbonate of magnesia, 2 cents; House, 30%; Senate, 2 cents. Ep-som salts, 3/4 cent; House, 1; Senate, 1/2. Kieserite, free; House, 1/4 cent; Senate, free. Calcined magnesia, 7 cents; House, 7; Senate, 5.

Crude magnesite, 15-32 cent; House, 5-16; Senate, 15-32. Pumice stone, wholly or partly manufactured, 3/4 cent; House, 55-100; Senate, 3/4.

Bentonite, unwrought and unmanufactured, \$1.50 a ton; House, \$1; Senate, \$1.50. Bentonite, wrought or manufactured, \$3.25 a ton; House, \$2 or \$3.25 or 30%; Senate, \$3.25.

Starting upon the second schedule relating to earthenware and glassware, the conferees accepted the Senate rate of \$1 a ton on crude feldspar, compared to the \$1.50 rate in the House bill.

Action on cement, one of the most controversial items in the bill, was deferred.

When the cement schedule was reached in the conference, there was considerable discussion. Representative Garner (Dem.), of Uvalde, Tex., ranking House minority conferee, told the conference that it was not in a position to act on that schedule as the House was "afraid to trust" its three majority conferees.

Mr. Garner stated after the conference that he called attention to this assurance, that he told the House majority conferees "your masters would not trust you" and that the conferees were foreclosed on taking any action on cement because the House "did not trust them." The cement schedule was passed over without action.

## Goldbeck on Pavement Bases

**B**ASES for asphalt pavements were discussed by A. T. Goldbeck, director of engineering of the National Crushed Stone Association, in a paper read recently before the Engineers' Club of Philadelphia. The greater part was devoted to the engineering features of base construction but some portions are of interest to the producers of materials.

The paper states that the use of 1:3:6 concrete, which was formerly almost standard for base construction, has had to be abandoned in favor of 1:2:4 concrete in some parts of the country because the leaner concrete was found to disintegrate rapidly by freezing and thawing. However, in those parts of the United States where the climate permits its use, the paper says that there is something to be said for the 1:3:6 base. The effect on the wearing surface is better because if there is cracking there are more and finer cracks with the lean mix owing perhaps more to its lower tensile strength than its lesser volume change with changes in temperature, although both are involved. Provided that it is strong enough to carry the traffic and durable enough for the existing subgrade conditions, the paper considers the lean mix base to have a slight advantage.

Gravel, macadam and black bases are briefly considered. It is stated that the subgrade conditions must be excellent where these are used, as they have no considerable slab resistance under statically applied loads, although they do develop momentary resistance to moving loads. Where the subgrade conditions are unfavorable to their use a sub-foundation of granular material

should be used to provide the thickness necessary to decrease the unit pressure on the subgrade. Bank run gravel, crushed stone and crushed slag are used for this. The author of the paper speaks of his own often quoted tests showing the load distributing value of macadam compared with concrete and warns the readers that the tests apply to only one set of conditions. It is his opinion that only actual service tests can determine equivalence in base design for respective types. Black bases are noted as having been in service for long terms of years, apparently with very satisfactory results where they have been properly supported.

## Atlas Lumnite Cement Releases Eckel Patents

**BY AN AGREEMENT** executed March 28, 1930, between the Atlas Lumnite Cement Co. and Edwin C. Eckel, Mr. Eckel withdraws his opposition to the proposed extension of the Spackman patents, while Lumnite releases all licensees under Eckel patents from liability for possible infringement of the Spackman patents. It will hereafter be possible, therefore, to permit reasonable competition between the two main alumina-cement making processes in the United States, and prevent unfair foreign competition.

There are at present no licenses under Eckel patents in any state or Canadian province; and existing cement or steel companies will be given preference in issuing such licenses, provided application be made through a responsible executive official, according to Mr. Eckel.

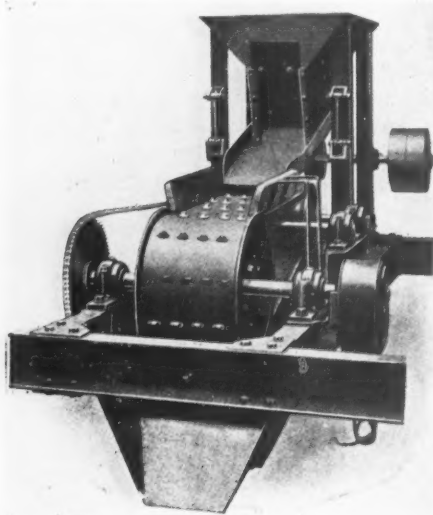
## Correction

**I**N the first installment of the article on the portland cement industry on the Pacific Coast, ROCK PRODUCTS, March 15, reference was made to the Sturtevant separator located in the plant of the Blue Diamond Co., Los Angeles. This is a 16-ft. diameter separator and not a 14-ft. Furthermore, the description is not exactly correct. The statement that there are three discharges from the air separator is not so, an air separator only has two discharges, one a fine product, and one of rejects, and the fact that there is a dust collecting system incorporated in this plant should not be construed, inasmuch as there is one connection to the air separator, as an outlet or a third discharge from the separator. In fact, this dust collecting system is for general all around cleanliness in the plant, and not the escape of dust from the separator, but from the connections and elevator primarily. But a little dust is removed from the separator by the dust collector, and it should not be interpreted the way the article is written in regard to this feature.

# New Machinery and Equipment

## Belt with Magnetic "Feelers"

A MODIFICATION of the usual type of magnetic separation device for removal of tramp iron from stone has been developed by the Rapid Magnetic Machine Co., Ltd.,



*Feed belt for removing tramp iron from stone*

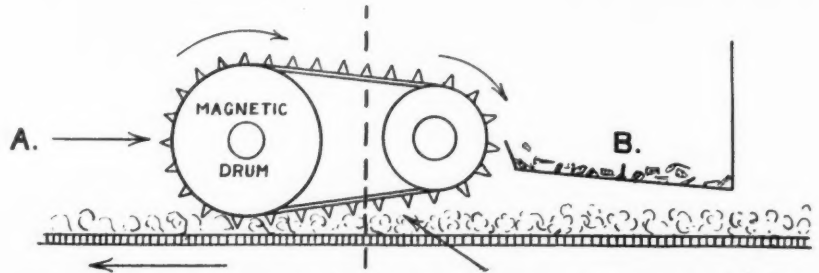
Birmingham, England. This, as illustrated herewith, comprises a feed belt fitted with feelers which become magnetic when passing over the magnetized pulley. The arrangement is said to make the removal of tramp iron more positive.

## New Power Unit

THE Buda Co., Harvey, Ill., has recently brought out a new 4-cylinder power unit, model H-199, of compact design and light in weight, developing 16 hp. at 800 r.p.m. to 45 hp. at 2000 r.p.m. Among features claimed for the new engine is the lubricating system by which a constant large quantity of oil at high pressure and velocity is said to be supplied. The cooling system is also claimed to be quite effective in bringing to and keeping the engine at the proper operating temperatures. Water is passed through the engine at all times by means of a water pump equipped with stainless steel shaft and leak-proof bearings.

The main bearings are the customary half shell, babbitt-lined type, but are shimless. Two halves of a bearing placed edge to edge effect a perfect circle. The connecting rods are babbitt-lined directly to the steel forgings. This is said to make a light and cool bearing, giving a perfect bond between the bearing and the steel forging.

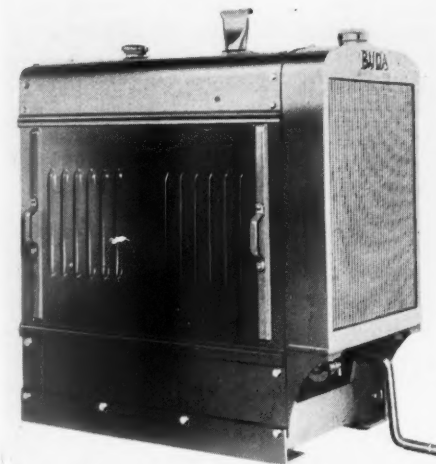
The valve tappet cluster assembly is made in two groups and designed for quick accessibility in service. Crankcase and cylinders



*The feelers become magnetic when passing over the magnetized pulley*

are of chrome nickel alloy iron. Provision is made for the use of fuel pump, oil filter and electric starting equipment when desired.

The air cleaner is built in as a part of the engine. A large capacity radiator is furnished. The engine has a pedestal bell housing making it possible to support the unit rigidly either with or without the channel frame. Sheet metal housing is of heavy gage material with sliding doors providing ample accessibility. A 12 gal. gasoline tank is provided in the hood of the unit which permits gravity flow of fuel to the carburetor.



*New 4-cylinder power unit*

The engine is fitted with a No. 4 S.A.E. bell housing which accommodates an 8-in. clutch. The unit can also be furnished with reduction gear, reversing gear and transmission. A close regulating governor is supplied. It is completely enclosed and operated directly on the butterfly valve on the carburetor.

## Mammoth Manganese Bucket

WHAT is claimed to be the largest all manganese-steel power shovel dipper has just been completed by the American Manganese Steel Co., Chicago Heights,

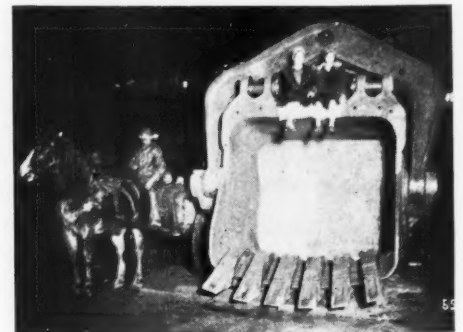
Ill. The dipper is 14 ft. high over the bail, 12 ft. wide between outsides of the bail brackets, and 14 ft. from the ends of the dipper teeth to the bottom of the door,



*Huge all-manganese steel power shovel dipper*

and weighs 37 tons empty. Capacity is 15 cu. yd. Some idea of the size is given in accompanying photo by comparing it with rig alongside or the two girls perched on it.

The dipper is in use on a Marion shovel at the United Electric Coal Co.'s operation at Danville, Ill., one of the largest coal stripping operations in the world.



*Showing relative size of bucket*

# Activities and Changes in the Sand, Gravel and Crushed Stone Industry in Texas

By Walter B. Lenhart  
Associate Editor, Rock Products

**Ambrose Sand and Gravel Co.**, which operated a plant at Anthony, Tex., with offices and mailing address Bonham, Tex., has closed its operations. The plant is located on a branch line called the Denison, Bonham and New Orleans railroad, a part of the M. K. T. system. Late in 1929 the railroad ceased operating and removed its rails, thus forcing the Ambrose plant to close, as it could not operate without railroad connections.

**Austin Sand and Gravel Co.** has a plant at West Side avenue, Austin, Tex., of which W. C. Moore is owner. Sand and gravel is taken from a pit with two 34-yd. Sauerman slackline cableway excavators. The oversize is crushed and rotary screens are used in the washing plant. The daily capacity is 150 yd., which is hauled by trucks, there being no railroad connections with the plant.

**Central Gravel Co., Inc.**, R. F. D. 8, Box 163, Waco, Tex., does all of its hauling with trucks, making no car shipments.

**Clifton George, Jr.**, 536 Milan Bldg., San Antonio, Tex., who had a plant at Alamo Heights, Tex., is no longer producing.

**Consumers Sand and Gravel Co.**, Waco, Tex., has discontinued the production of sand and gravel.

**Cibola Gravel Co.**, San Antonio, Tex., is no longer in business, as it was absorbed by the Turner Gravel Co., 825 Morales street, San Antonio.

**Clem Gravel Co.**, 601 Central Bank Building, Dallas, Tex., has also abandoned its plant at Anthony, Tex., owing to lack of railroad connections. However, its equipment is still on the premises at Anthony.

**Cooper-Storey Co.**, with offices in the Praetorian building, Dallas, Tex., operates a plant at Love Field, six miles from Dallas. It takes gravel from a pit by dragline stripping. Loading and hauling is all done with trucks, as there are no rail connections. The production is bank run only, no washing or screening being done. Daily capacity, 600 yd. F. B. Storey and P. P. Cooper compose the partnership.

**Dallas Transportation Co.**, with offices 817 Bourbon, Dallas, Tex., produces sand and gravel, although not on a large scale.

**J. C. Dielmann Co., Inc.**, 521 El Paso road, San Antonio, Tex., of which William V. Dielmann is manager, operates a sand pit, from which it takes two carloads daily. This is located on the San Antonio and Southern Railroad.

**Dallas Washed and Screened Gravel Co.**, 912 Santa Fe building, Dallas, Tex., now has two plants in operation—one at Cloudy and one at Tarrant, with postoffice for plants, R. F. D. 3, Arlington, Tex. The new officers of the company are: President, R. J. Windrow; vice-president and general manager, Ralph S. Windrow, both of Dallas, and superintendent, C. P. Hadley, located at Arlington. The annual capacity of the two plants is 350,000 tons sand and gravel.

**East Texas Gravel Co.**, Bois d'Arc Spur, Tex., on Southern Pacific lines, with office at Dallas in the Santa Fe building, from a quarry takes 2000 yd. daily of ballast and commercial stone. It uses a dragline excavator, locomotives and cars. The product is washed. The plant is 23 miles from Dallas. Howard Parks is president; Dan S. Hartson, vice-president, and Kendricks Buster is secretary and treasurer.

**Farrell-Inge Gravel Co.**, Route 6, Dallas, Tex., in the latter part of 1929 was taken over by the Dallas Washed and Screened Gravel Co. and is now operated by the latter.

**Fort Worth Sand and Gravel Co., Inc.**, has moved from Seventh street to larger quarters, 601 Electric building, Fort Worth, Tex. J. O. Hart and his son act as general superintendents now, with W. R. Thomas superintendent of the new plant, located about 12 miles from Fort Worth. Superintendent Jefferies is no longer with the company.

**George Greenville**, Galveston, Tex., has discontinued operations as a sand and gravel producer.

**Gainesville Gravel Co.**, Gainesville, with plant at Lindsay, Tex., has exhausted its deposit and discontinued the production of gravel.

**Granite Gravel and Sand Co.**, 406 Esperson

Bldg., Houston, Tex., operates a plant at Harwell, near Kingsland, Tex.

**C. G. Griffin**, 1115 Commerce street, Houston, Tex., heretofore not listed, produces sand, which is taken from the San Jacinto river. The annual output is 10,000 tons of sand, and dredges, towboats and barges are used in the operations. Mrs. C. G. Griffin is owner of the plant.

## Editor's Note

**MR. LENHART** has recently spent considerable time in Texas, as the contents of this page discloses. He carries a copy of *Rock Products Directory of the Industry with him and incidental to his other work has been checking up first-hand on some of the data in the Directory. Many of these items are of news interest. All will prove helpful to holders of Rock Products Directory. As time and opportunity permit, we hope to cover other states in a similar manner. Needless to say, we invite notices of changes and corrections from our readers.—The Editor.*

**Gifford-Hill and Co., Inc.**, with offices in the North Texas building, Dallas, Tex., now operate seven plants. These are: one at Forest Hill, La.; two at Grand Prairie, Tex.; three at Texarkana, Tex., and one at Hart Spur, Tex., which they took over recently from the Trinity Gravel Co. The Texarkana plants are on the Texas and Pacific railroad and the other two on the Cotton Belt railroad. P. W. Gifford is now president of the company. The total production annually is close to 3,000,000 yd. of sand and gravel.

**Hartson Sand and Gravel Co.**, Santa Fe building, Dallas, Tex., in the latter part of 1929 was taken over by the Dallas Washed Sand and Screened Gravel Co., which also has its office in Dallas.

**Horton and Horton**, with offices 3201 McKinney, Houston, Tex., produces sand and shells. George Horton is a member of the firm.

**W. D. Haden Co.**, 814 American National Insurance Bldg., Galveston, Tex., with plant at West Point, Tex., advises that its present superintendent is O. J. Carter.

**W. L. Jones**, 1-Fannin street, Houston, Tex., produces annually 50,000 tons of sand. This is dredged from the San Jacinto river, near Houston. Towboats and barges are used for conveying.

**Willard E. Jackson**, 3215 Bosque road, Waco, Tex., is not producing sand and gravel, merely engaged in the hauling of it.

**George T. Jambers**, 400 Nolan street, San Antonio, Tex., has been in the sand and gravel business for 22 years. His sand pit is located at Saspmco, Tex., 18 miles from San Antonio; also has a pit at Tarbutton, where the product is hand loaded, using wheelbarrows. He produces about 10 cars sand daily. Mules and fresnos in the pit dump to the hopper, from where it is delivered to washing plant by belt conveyor. The pit is on the T. & N. O. R.R.

**C. W. Ling**, 302 Lombardo street, San Antonio, Tex., produces on a small scale.

**Louis Lypschitz**, Waco, Tex., is not in the production of rock products.

**Mrs. Maggie M. Kelso**, Galveston, Tex., listed as a sand and gravel producer, is out of business.

**George Morovich**, listed as a producer, with address Galveston, Tex., is out of business.

**McDaniel Bros. Gravel Co.**, Gainesville, Tex., producing gravel, now has two vice-presidents, these being M. McDaniels and M. L. McDaniels.

**James McGee**, Galveston, Tex., listed as pro-

ducer of sand and gravel, is only in the brokerage end of the business.

**Lon Martin**, Box 116, Austin, Tex., with a slackline cableway excavator produces 50 yd. sand and gravel daily, which is taken from a pit. The operation is on the Lower Barton Creek road and the product is not washed nor screened.

**North Loop Gravel Co., Inc.**, 328 Nolan street, San Antonio, Tex., operated by the Federal Supply Co., under the name of North Loop Gravel Co., Inc., has merged with the Southern Aggregates Corp., of Houston. Therefore, the North Loop company has ceased to exist.

**Ochander Bros.**, Waco, Tex., are now not producing any rock products.

**M. C. Otto, Inc.**, 1219 Acuff street, Houston, Tex., is not a producer, as reported, but is in the brokerage end of the business.

**Parker Bros.**, 1102 Holly street, Houston, Tex., with offices also at Harrisburgh, Tex., produce sand and shells. The plant is located at Rosebergh, Tex. They supply the Trinity Portland Cement Co. with shells. A small-sized road is produced, which is dredged and is washed and screened, the output being 60,000 tons and shell production 200,000 tons annually. W. R. Parker is president and Mr. James is sales manager.

**W. T. Richard**, Houston, Tex., is no longer in business as a producer of sand and gravel.

**Rosenburg Sand and Gravel Co.**, 415 Beatty building, Houston, Tex., has been succeeded by Parker Bros., 1102 Holly street, Houston.

**C. W. Roberts Sand and Gravel Co.**, Dallas, Tex., with operations on Eagles Ford road, takes 400 yd. daily from a pit. It uses two draglines and a dredge boat. The product is washed and screened in a stationary plant. Trucks are used to haul the product. C. W. Roberts is owner of the plant and J. A. Knight is superintendent.

**Suderman and Young**, Galveston, Tex., produce shells only.

**P. M. Skinner**, 1109 Santa Fe Bldg., Dallas, Tex., is a producer of crushed stone.

**San Antonio Sand Co.**, San Antonio, Tex., is no longer engaged in the production of sand at San Antonio.

**Charles R. Slauter**, 33d and Summer avenue, Waco, Tex., is not engaged in the production of rock products of any kind.

**Smithville Gravel and Sand Co.**, Smithville, Tex., has a small operation six miles from West Point, Tex., where it produces sand and gravel from a pit. Loading is done by hand and with scrapers and hauled by wagon.

**Strong's Gravel and Sand Pit**, at Eagles Ford Road, Dallas, Tex., uses a dragline excavator in its operations. About 200 yd. daily are taken from the pit, which is washed. W. T. Strong is president and J. Roy Strong is a partner in the business.

**Southern Gravel Co.**, Austin, Tex., uses a slackline cableway excavator to take gravel from a pit deposit. The product is washed and conveyed in trucks. Its daily capacity is about 200 yd. A. D. Alderson is president of the company.

**Southern Aggregates Corp.**, with offices at Houston, Tex., recently took in the North Loop Gravel Co., Inc., of San Antonio and the Southern Aggregates Corp. will have four plants. It will operate the plant of the North Loop company, a new one at Seguin, Tex., and will build two in Louisiana. The officers of the Southern Aggregates Corp. are: J. S. Edmundson, president; J. E. Browne, vice-president; Howard Kenyon, vice-president and M. J. Beaver, secretary and treasurer.

**Charles M. Schoenfeld**, 324 Hunstock avenue, San Antonio, Tex., built a crushing plant at his old quarry that was primarily opened for the production of riprap. The face of the quarry is one of the highest in the district, being in the neighborhood of 125 ft. high. About 1200 tons of ballast, commercial stone and riprap are produced daily. Power shovels are used for quarrying and loading. The plant is unusual in that one can stand near the primary crusher and see practically every screen, elevator and crusher, as no structural members, floors, etc., are in the way to obstruct the vision. W. P. Cashen is superintendent of the company.

**Southwest Stone Co.**, 1611 Santa Fe building, Dallas, Tex., now operates four plants, which are located at Bridgeport, Chico and Knippa, Tex., and Stringtown, Okla. The Bridgeport and Chico plants produce limestone; the Knippa plant, trap rock; and the Stringtown plant, hard blue limestone. Power shovels are used in loading and steam locomotives and Western dump cars deliver to the plants. Shipments are made by rail. The total annual production is about 525,000 tons, of which 260,000 tons are ballast, 260,000 tons aggregates and 5000 tons agstone. W. F. Wise is president, general manager and purchasing agent; H. C. Perry, vice-president, secretary and treasurer; T. F. Sharp, general superintendent; R. L. Saunders is sales manager, all located at Dallas. The superintendents are: C. C. Ferriss at Bridgeport, E. D. Sheridan at Chico, E. O. Jones at Knippa, and W. R. Thacker at Stringtown.

**Saxet Sand and Gravel Co.**, Esperson Bldg., Houston, Tex., operates a sand and gravel plant at Victoria, Tex., although the company is engaged in other lines also, such as brick making, oil production, general contracting, etc. From its pit it takes 30 cars of sand and gravel daily, using a dredge. The product is washed and screened. The plant is on the S. P. and M. P. P. R. R. The officers of the company are: Sam R. Merril, president; W. L. Pearson, vice-president; W. H. Rankin, secretary and treasurer; J. A. Darby, general manager; T. M. Norsworthy, general sales manager; H. T. Brewster, plant manager.

**Trinity Farm Gravel Co.**, Record Crossing, Dallas, Tex., produces sand and gravel.

**Turner Gravel Co.**, 825 Morales street, San Antonio, Tex., in addition to its sand and gravel plants, also conducts a concrete products plant.

**Trinity Gravel Co.**, Kirby building, Dallas, Tex., with plant at Hart Spur, Tex., in the latter part of 1929, was succeeded by **Gifford-Hill and Co., Inc.**, who now operate the Hart Spur plant.

**Turner-Rand Gravel Co.**, Schertz, Tex., 18 miles from San Antonio, is building a washing plant, which it will have ready in April. Gravel and limerock sand are its products. Henry Rand is president of the company and A. P. Turner is general manager.

**Texas Silica Co.**, 322 West building, Houston, Tex., has a plant at Setag, Tex., on the W. B. T. and N. railroad, where it produces filter sands and foundry sands. These are taken from a pit with dragline excavators and trucks deliver to the plant. The product is screened, washed and dried. H. E. L. Tooms is president and treasurer and R. C. Evans secretary of the company.

**Texas and Pacific Railroad Co.'s** plant at Allamore, Tex., is operated by **Gifford-Hill and Co., Inc.** This quarry supplies trap rock. Power shovels are used and locomotives and cars do the conveying. The plant is driven by Diesel engines. The daily capacity is 2000 tons. C. L. Holly is superintendent.

**Texas Sand and Gravel Co., Inc.**, Waco, Tex., operates plants at Ady, Colorado, Gross Spur, Magenta, Saragosa and Tascosa, Tex., with 3 pits at Waco. At Amarillo it has an office and does not have a plant at Texand, Tex. W. D. Eastland is vice-president and secretary of the company, located at Waco; Roy P. Eastland is treasurer, located at Amarillo, Tex.

**Travis Sand and Gravel Co.** has offices in the Scarborough building, Austin, Tex., with a plant three miles east of Austin. R. E. Janes is owner of the company and Park Terrell is plant superintendent. With a slackline cableway excavator the company produces 400 yd. sand and gravel daily. The product is screened. The company is planning the construction of another plant near Austin.

**Texas Construction Materials Co.**, 1506 Petroleum building, Houston, Tex., has road gravel pits at Gemmer, Tanner Spur, Talton and Buda, Tex., and washing plants at Burt Spur, Eagle Lake, Gemmer, Laban Spur, Romayor, and Tanner Spur, Tex. It excavates with draglines, power shovels and pump dredges. Delivery is made by draglines and pipe lines. The annual production is about 1,000,000 tons sand and 1,000,000 tons gravel. The officers of the company are: W. H. Gemmer, president; W. E. Sampson, vice-president and general manager, both of Houston; E. A. Fletcher, vice-president, located at Beaumont; E. P. Gemmer, secretary, treasurer and sales manager; T. J. Beesley superintendent and production manager, and H. F. Miller, purchasing agent, all of Houston.

**Vilbig Bros.**, Paris, Tex., near Dallas, use a dredge and dragline in producing 200 yd. sand and gravel daily. Trucks are used for hauling, as there are no railroad connections.

**J. Lee Vilbig and Co.**, 2517 Eakin street, Dallas, Tex., produce sand and gravel from a pit near Dallas. The daily capacity is about 200 yd., which is washed and screened. A dragline excavator is used and trucks haul the product.

**Waco Sand and Gravel Co.**, Waco, Tex., is no longer a producer of sand and gravel or rock products of any kind.

## President Signs Bill for Larger Federal Aid for Highways

**P**RESIDENT HOOVER on April 4 signed the Dowell-Phipps highway bill carrying authorization of \$300,000,000 for road construction under the federal aid plan, throughout the United States.

Of the total, \$125,000,000 is authorized to be expended as the federal government contribution to road construction during the fiscal years 1932 and 1933, and \$50,000,000 is added to the \$75,000,000 already authorized for 1931.

When he approved the measure, President Hoover made available what was described by representatives of the American Association of State Highway Officials, who were present at the signing of the bill, as the largest authorization for a road building program ever passed by congress. It exceeds all previous amounts for such purposes by \$50,000,000 per annum. The authorization for road building is increased from a total of \$75,000,000 to \$125,000,000.

After the signing of the bill, W. C. Markham, executive secretary of the state highway officials, with headquarters in Washington, D. C., stated orally that each year the states have provided funds far in excess of the federal authorizations, at such a ratio that the increase of federal funds of \$50,000,000 for 1931 really means an increase in the road building program of not less than \$120,000,000.

"Coming at this time when there is great need of relief for unemployment," Mr. Markham said, "it will mean an immediate quickening of the industries connected with all phases of the road-building industry and not less than 125,000 additional men will be put on a steady pay roll for this season."

"Many of the state highway departments have surveys and plans completed for additional mileages and with the passage and approval of this bill, there will be immediate calling for bids on these projects."

## Paxtang Quarries Not Flooded Again

**A**BOUT FOUR YEARS ago the Paxtang Quarries near Harrisburg, Penn., struck an underground water channel that fed so much water into the pit that it became necessary to remove all the equipment, shovels, etc., and abandon the quarry. Within 36 hours the water had completely filled the pit.

It was reported recently that the second pit opened up by J. M. Whittock, president and owner of the quarry, had also struck a water course that completely flooded the pit but upon investigations by one of the editors of **ROCK PRODUCTS** this rumor was found to be without foundation, except, that Mr. Whittock did pull the pumps out of the lower levels early in April and allowed that part of the pit to fill up. It has been costing the

company in the neighborhood of \$300 per month to keep that part of the quarry free from water and as the owner had plenty of rock above water level it was decided to use the cheaper rock. Later, when market conditions are better in the vicinity of Harrisburg, the Paxtang Quarries may return to mining the lower levels.

## Trade Standards of the Compressed Air Society

**T**HE fourth edition of the Trade Standards of the Compressed Air Society has just been published, and copies may be had upon application to C. H. Rohbach, secretary, 90 West St., New York, at a cost of 50 cents each.

New material in the pamphlet comprises a new formula for use in air compressor testing, this being accurate for higher water columns than that previously used, thereby extending the capacity of a nozzle of a given size through a greater useful range; further suggestions in connection with the installation and operation of air compressors; caution against the use of old boilers or tanks as air receivers; suggestion for handling very cold "cooling water" so as to prevent condensation and undue wear on the air cylinder, and another illustration of an air cleaning device.

### OWNERSHIP OF ROCK PRODUCTS

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of **ROCK PRODUCTS**, published every second Saturday at 542 South Dearborn street, Chicago, Ill., for April, 1930. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Nathan C. Rockwood, who, having been duly sworn according to law, deposes and says that he is the manager of **ROCK PRODUCTS**, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Trade Press Publishing Corp.; Editor, Nathan C. Rockwood; Managing Editor, None; Business Manager, Nathan C. Rockwood.

2. That the owners of 1% or more of the total amount of stock are: W. D. Callender, Nathan C. Rockwood, both of 542 South Dearborn street, Chicago, Ill.

3. That there are no bondholders, mortgagees, or other security holders owning or holding 1% or more of total amount of bonds, mortgages or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

NATHAN C. ROCKWOOD,

Business Manager.

Sworn to and subscribed before me this 6th day of April, 1930.

(SEAL)

CHARLES O. NELSON.

(My commission expires April 13, 1930.)

# News of All the Industry

## Incorporations

**Chubbuck Lime Co.**, \$100,000. (Colorado company incorporated in California.)

**New Martinsville Sand and Gravel Co.**, New Martinsville, W. Va., \$10,000.

**Frid Bros., Ltd.**, Hamilton, Ont., \$100,000. To deal in sand, gravel, brick, etc.

**Marine Sand and Gravel Co.** changed name to **Hoskins Coal Co.**, 209 S. La Salle St., Chicago.

**Eastern Sand and Gravel Corp.**, Philadelphia, Penn., increased capital stock from \$300,000 to \$2,000,000.

**New Point Stone Co., Inc.**, Batesville, Ind., 500 shares, par value \$100 each. Theo. Wanstrath, Johanna Wanstrath and James B. Wirt.

**Concrete Block Corp., Ltd.**, Toronto, Canada, 2000 shares preferred, par value \$100 each, and 12,000 shares common, no par value.

**Ryan Ready-Mixed Concrete Corp.**, New York City, \$165,000. G. W. Titcomb, 215 Montague St., New York City.

**Imperial Stone Arts Co.**, 14601 Grand River Ave., Detroit, Mich., 75,000 shares no par value stock. To deal in building materials.

**Laval Sand Co., Ltd.**, Montreal, Canada, 5000 shares preferred stock, par value \$10 each, and 50,000 shares common stock, no par value.

**Key Largo Quarries, Inc.**, Miami, Fla., 50 shares, par value \$10 each. To produce granite, sandstone, etc. G. B. Wilson, J. C. Whippo and C. R. Pierce.

**Miller Sand and Gravel Co.**, Elizabethton, Tenn., \$20,000. M. F. Miller, F. A. Swift and W. B. Kester.

**Bridgeton Wash Gravel Corp.**, Bridgeton, N. J., \$50,000. R. Winfield Hunt, Franklin J. Lore and Hannah B. Lore, all of Bridgeton.

**Mishawaka Sand and Gravel Corp.**, Mishawaka, Ind., 1000 shares, no par value. Fred W. Steinke, Philip H. Matz and Leonard Zick.

**Neal Gravel Co.**, Mattoon, Ill., increased capital stock from 1500 shares to 2500 shares, the additional 1000 shares being preferred stock with par value of \$100 each.

**Marine Dredge and Gravel Co.**, 75 E. Wacker Drive, Chicago, Ill., 7500 shares no par value stock. John R. Whitman, Thomas J. Downs and John D. Defeo.

**Maugus Block Sand and Gravel Co., Inc.**, Wellesley, Mass., \$100,000 (1000 shares at \$100 each). Richard L. Bennett, Victoria Bennett and Samuel Kalperin, Kingsbury St., Wellesley.

## Quarries

**Alabama Lime and Stone Corp.'s** Calera, Ala., plant, which was closed down several months ago, is to resume operations again.

**Hauser Construction Co.'s** quarries on North Coos river near Marshfield, Ore., will start operations on April 15, according to Manager W. H. Harrison.

**Fred B. Hamilton's** stone quarry and gravel pit in Bellefontaine, Ohio, has been purchased by E. G. Buchsieb, fertilizer manufacturer of Columbus, Ohio. The property is known as the O'Brien stone quarry.

**Ottawa, Ohio.** Thieves broke the gas pump at the Lanwehr Stone Co.'s quarry southeast of Ottawa and stole thirty gallons of gasoline. It appears that gas was the object of their search, as no other property of the plant was molested.

**Paris Rock Quarry's** building at Paris, Ky., housing the rock crushing equipment and electric motors of the plant, was destroyed by fire recently with an estimated loss of \$10,000. An explosion preceded the fire, but the exact origin of the blaze has not been determined.

## Sand and Gravel

**Arkansas River Sand Co.**, McBrieny Bldg., Tulsa, Okla., is dismantling its plant and moving it to a new location.

**The Incline Sand and Gravel Co.**, Boone, Iowa, recently organized by the Burris Bros., has established headquarters at No. 823 West Third St., Boone. H. H. Burris is president of the company.

**Dayton Sand and Gravel Co.**, Dayton, Ore., has

been awarded contract to furnish 6320 yd. of gravel to the state highway commission, to be used in road work.

**John N. Bos Sand Co.**, 208 W. Washington St., Chicago, Ill., has moved its offices to its own building at 6600 W. Fullerton Ave., Chicago. Plans are now under way for the enlargement of the building and yards.

**Koch Sand and Gravel Co.**, Evansville, Ind., has resumed operations in the Owensboro, Ky., district. The steamer "Koch" with digger and other equipment was taken to Owensboro on April 2. The company is anticipating a busy season.

**The Albany Sand and Gravel Co.**, Albany, Ore., are now building a 300-ft. extension to the railway spur serving its utility bunkers, and are making other improvements and additions to take care of increased business.

**S. B. Johnson and Son's** sand and gravel plant, located in the eastern part of Winterset, Iowa, has been purchased by the Hawkeye Lumber Co., who will operate the plant and maintain a distributing yard at the plant as well as a smaller stock at their lumber yards on West Jefferson street, Winterset.

**Des Moines, Iowa.** Testimony for the defense in the injunction suit brought by the city of Des Moines to enjoin the Independent Sand and Gravel Co-operative Association from taking sand out of the Raccoon river has been started. The sand company will endeavor to refute the contentions of the city that it is jeopardizing the municipality's water supply by showing that the gradual change in the river channel near the waterworks, which the city claims in interfering with the water supply, is not the result of the removal of sand from the river.

## Cement

**Lehigh Portland Cement Co.'s** plant at New Castle, Penn., has resumed operations. According to Superintendent W. H. Kleckner, the plant will operate at capacity.

**Alpha Portland Cement Co.'s** plant at Manheim, W. Va., has resumed operations after a temporary shutdown. The Ironton, Ohio, plant of the company, which has been idle since last December, has also resumed operations.

**Cumberland Portland Cement Co.'s** plant at Cowan, Tenn., which has not been in operation since the first of the year, is again producing cement. The quarries were opened March 20 in preparation for the opening of the main plant.

**Dewey Portland Cement Co.'s** plant at Dewey, Okla., was visited recently by members of the Bartlesville Engineers Club. After inspecting the plant the engineers were entertained at dinner by officials of the cement company. A feature of the entertainment program was the showing of slow-motion pictures furnished by the American Society of Mechanical Engineers.

## Cement Products

**Cadwell Sand and Gravel Co., Ltd.**, Windsor, Ont., is preparing plans for a \$60,000 concrete block plant.

**The Ready-Mixed Concrete Co.'s** plant now under construction at Erie, Penn., will be under the management of Harry G. Riblet, formerly of the maintenance division of the municipal engineering bureau of Erie.

**Concrete Pipe and Sand Co.**, incorporation notice of which appeared in last issue, is to build a plant at Wheeling, W. Va., within the next few months for the manufacture of concrete pipe and other products. Options have been taken on a number of sites, although the location of the plant has not yet been definitely determined.

## Miscellaneous Rock Products

**Walter R. Talbot.** Winchester, Va., has started developing a large silica sand deposit located in the western part of Frederick county, Va. Investigations show the deposit to cover over 100 acres.

**American Potash and Chemical Corp.** has engaged the United Engineers and Constructors, Inc., to design and construct large additions to its manufacturing facilities at Trona, San Bernardino county, Calif. The improvements will consist of a new power plant and large extensions to the potash and borax plants.

## Personals

**B. E. Neal**, brother of Herman E. Neal, late president of the Neal Gravel Co., Mattoon, Ill., is to take over the presidency of the gravel company.

**George W. Browse**, formerly of New Martinsville, W. Va., is now plant superintendent for the West Penn Sand and Gravel Co., Rochester, Penn.

**Max Forrer** of Gypsum, Ohio, has been appointed general manager of the United States Gypsum Co.'s plant at Lancaster, Ohio.

**A. T. Ward** has been appointed regional sales manager in charge of Eastern territory for the Productive Equipment Corp., Chicago, Ill., with offices at 50 Church St., New York City.

**William B. Newberry** has resigned from the board of directors of the Medusa Portland Cement Co., Cleveland, Ohio, and has been succeeded by **Frederic Pickford**, who has been with the organization for some time.

**Elton Hoyt, II**, of Pickands, Mather and Co., was elected a director of the Otis Steel Co., Cleveland, Ohio. C. F. Bachelder, E. F. Hayes and C. A. Otis retired as directors. Officers were re-elected with the exception of the office of chairman, which position was left open.

**A. W. Daniels** has been elected vice-president in charge of sales for the American Manganese Steel Co., Chicago Heights, Ill. Mr. Daniels entered the employ of the American Manganese Steel Co. as assistant to the industrial engineer, and in 1920 became Chicago office manager. Two years later he was promoted to central sales manager, and in 1923 was made general sales manager.



A. W. Daniels

**C. D. Prickett**, vice-president and director of the Hercules Powder Co., Wilmington, Del., celebrating his 50th year of service to the explosives industry, was honored guest of Russell H. Dunham, president of the company, at a dinner attended by the members of the Hercules board of directors. The veteran powder maker started in the explosives business in 1880 and was elected a director of the Hercules Powder Co. in 1912. Later he became vice-president. For the past 18 years he has directed the black powder operations of the company and has served on important committees directing the company's policies.

**John S. Walker, Jr.**, manager of the Huntington branch office of the Sullivan Machinery Co., Chicago, Ill., since 1912, and a member of the Sullivan organization since 1901, has retired to engage in the banking business in Huntington. **Morley S. Sloman**, who has been associated with the Pittsburgh office of the company for the past 14 years, has been appointed manager at Huntington to succeed Mr. Walker.

**Ian Duncan**, formerly of Glasgow, Scotland, has sailed for Santiago, Chile, where he will represent the Gardner-Denver Co. in the mining districts of that country. His headquarters will be with Spencer & Waters, Ltd., Chilean agents for Gardner-Denver. **B. Van Dyke** of the Quincy, Ill., sales division of Gardner-Denver, has been transferred to the New York office of the company. **Hendrick Stolk**, until recently with Stokvis and Zonen of Holland, has been transferred to St. Louis from the Quincy plant.

## Obituaries

**Anthony L. Rebman**, 20 years old, was killed in a cave-in at the Harry Oversch gravel pit near West Lafayette, Ind., on April 1.

**Frank Neff**, employed at the Crescent Stone Co. quarry northwest of Bloomington, Ind., was killed on April 2 when crushed under a block of stone weighing 36 tons. He was 37 years old.

**George I. Dungan**, Atlantic City representative for the Edison Portland Cement Co., New Village, N. J., succumbed to a sudden attack of heart dis-

case on March 23 at his home in Longport, N. J. He was 49 years of age.

**Stanley J. Addis**, 28 years old, an employee of the Mt. Carmel Sand and Gravel Co., Mt. Carmel, Ill., was drowned in the Wabash river at Mt. Carmel on April 2 when he fell off a sand barge. The barge was being towed upstream to be unloaded when the accident occurred.

## Manufacturers

**Electric Machinery Manufacturing Co.**, Minneapolis, Minn., has moved its Chicago office to Room 1567, 20 North Wacker Drive Bldg.

**Baldwin Locomotive Works**, Philadelphia, Penn., has been awarded contract for five Pacific type locomotives and five switching locomotives by the Central Railroad of New Jersey.

**Chain Belt Co.**, Milwaukee, Wis., has appointed the Corbin Supply Co. of Macon, Ga., as representatives for its complete line of chain and transmission equipment.

**Trackson Co.**, Milwaukee, Wis., has appointed the Concrete Machinery and Supply Co., 777 E. Merrill Ave., Los Angeles, Calif., as distributor of Trackson tractor equipment for the McCormick-Deering tractor in the Los Angeles territory.

**Fairbanks, Morse and Co.**, Chicago, at its annual meeting re-elected the retiring directors. At the organization meeting F. C. Dierks was elected secretary, replacing F. M. Boughey, resigned. W. E. Miller, vice-president, also resigned. Other officers were re-elected.

**The Lincoln Electric Co.**, Cleveland, Ohio, announces the opening of new offices in Saginaw, Mich., at 338 Barnard St., in charge of J. E. Luter; in Fort Wayne, Ind., at 225 E. Columbia St., in charge of D. H. Carver; and at Oil City, Penn., in charge of E. D. Anderson.

**Republic Rubber Co.**, Youngstown, Ohio, has just finished the installation of a new 60-in. by 30-ft. Farrel press, equipped with two rows of 12 hydraulic rams which operate under 2000 lb. hydraulic pressure per square inch, giving a total pressure of 738,912 lb. on the platens. The total weight of the press is 340,000 lb.

**Foot Bros. Gear and Machine Co.**, Chicago, Ill., has appointed Sutor and Co., 2008 E. Slauson Ave., Los Angeles, Calif., as representative for its IXL speed reducers and gear products. The Los Angeles territory, covered by this new representative, extends from the southern boundary of California up to a line drawn across the state just north of Bakersfield.

**Goodyear Tire and Rubber Co.**, Akron, Ohio, elected the following new directors at its recent annual stockholders' meeting: J. T. Begg, W. R. Burwell, A. G. Partridge, T. M. Girdler, G. A. Martin, J. R. Nutt, H. W. O'Melveny and C. F. Stone. These men succeed R. H. Bishop, Jr., Fayette Brown, G. B. Durrell, Elton Hoyt, W. B. Manton, R. L. Robinson, John Sherwin and S. L. Smith. Other directors were re-elected.

**Chicago Pneumatic Tool Co.**, New York City, announces the opening of new branch offices in the Perrine Bldg., Oklahoma City, Okla.; 327 Philcade Bldg., Tulsa, Okla.; Merchants and Manufacturers Bldg., Houston, Tex. Service stations and warehouses have been established at both Oklahoma City and Houston, where air and gas compressors, engines, pneumatic and electric tools, rock drills, etc., will be carried, as well as parts for servicing.

**General Electric Co.** employees numbering 37, who during 1929 contributed to the efficiency of the company in an unusual degree, have been given awards under the Charles A. Coffin Foundation. The award in each case consists of a certificate of merit and a substantial sum. Many of the men made suggestions which mean a definite annual saving to the company. In nine cases these savings have been estimated to total more than \$1,250,000 a year.

## Trade Literature

**NOTICE**—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention **Rock Products**.

**Fire Brick.** Folder, outlining eight important advantages of Laclede fire brick. **LACLEDE-CHRISTY CLAY PRODUCTS CO.**, St. Louis, Mo.

**Construction.** Attractive broadside outlining how success in modern construction rests in building to the value line. **MORTON C. TUTTLE CO.**, Boston, Mass.

**Drag Shovel Attachments.** Bulletin No. 900 on Page drag shovel attachments for augmenting scope of Page dragline buckets. Completely illustrated with full details and specifications. **PAGE ENGINEERING CO.**, Chicago, Ill.

**Aqualgel.** The use of aqualgel, a hydrous silicate of alumina of volcanic origin, used in cement, mor-

tar and concrete as a corrective for the deteriorating effects of water, is covered in Bulletin No. 105. **SILICA PRODUCTS CO.**, Kansas City, Mo.

**Locomotives.** Important features of Whitcomb locomotives of the gasoline, distillate, Diesel, storage battery, trolley and oil-electric types are covered in a new folder just issued by **GEORGE D. WHITCOMB CO.**, Rochelle, Ill.

**Screen Pulverizer.** Circular describing Raymond No. 90 screen pulverizer for use in any plant where a pulverized material is required in small quantities and of a uniform fineness. **RAYMOND BROS. IMPACT PULVERIZER CO.**, Chicago, Ill.

**Motors, Compressors, Generators, etc.** Bulletin No. 37, containing a complete list of all Rockford rebuilt and new equipment, with complete descriptions, illustrations and prices. **ROCKFORD POWER MACHINERY CO.**, Rockford, Ill.

**Explosives.** The January issue of The Explosives Service Bulletin contains an interesting article on "Tunnel Blasting in Quarries," by S. R. Russell, telling when and how this method can be used most successfully. **E. J. DU PONT DE NEMOURS AND CO., INC.**, Wilmington, Del.

**Pumicite.** The origin, chemical and physical analysis of pumicite, its uses with lime and cement mortars, and the field for its development, is covered in an interesting booklet just issued. The booklet also contains some interesting test data on plain concrete and concrete with pumicite as an admixture. **THE PUMICITE CO.**, St. Louis, Mo.

**Combustion Control.** "Metered Combustion Control for Boiler Furnaces" is the title of a new booklet, No. 660. Control of stoker fired furnaces, powdered fuel furnaces, and the general subject of combustion control for boiler furnaces is covered very comprehensively in this booklet. **LEEDS AND NORTHRUP CO.**, Philadelphia, Penn.

**Construction Equipment.** Broadside illustrating and listing principal items of equipment manufactured and distributed by the National Equipment Corp., including such items as central mixing plants, derrick, draglines, pumps, hoists, weighing hoppers, etc., etc. **NATIONAL EQUIPMENT CORP.**, Milwaukee, Wis.

**Refractories.** The code of ethics adopted by the American Refractories Institute in an effort to eliminate unfair trade practices, unfair competition and economic waste, is covered in a little booklet recently issued by the institute. Also very helpful and interesting are the loose-leaf pages giving classification of modified rectangular or difficult fire clay, silica and high alumina shapes. **AMERICAN REFRACTORIES INSTITUTE**, Pittsburgh.

**Central Mixing Plants.** Catalog No. 185, covering layout of Rex central mixing plants and various units thereof, such as stationary mixers, material elevators, belt conveyors, truck mixers, bulk cement hauling, etc. Completely illustrated with full details and specifications. **CHAIN BELT CO.**, Milwaukee, Wis.

**Explosives.** April issue of "Explosives Progress" gives a review of the recent report of Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, and contains interesting articles on the use of explosives in road building. **INSTITUTE OF MAKERS OF EXPLOSIVES**, New York City.

**Gyratory Crushers.** Bulletin No. 1461-B on Superior McCully fine reduction gyratory crusher, used principally for secondary reduction, with reversible top shell, concaves either of chilled cast iron or of manganese steel, automatic lubrication of eccentric and gearing, and other excellent features. **ALLIS-CHALMERS MANUFACTURING CO.**, Milwaukee, Wis.

**Pumping Equipment.** "Successful Canadian Pumping Stations" is the title of a new 28-page bulletin, No. E-1134, describing pumping stations notable for satisfactory operation and high efficiency. The features of design and construction of De Laval pumping equipment employed in these stations are outlined in the bulletin, which is exceptionally well illustrated. **DE LAVAL STEAM TURBINE CO.**, Trenton, N. J.

**Centrifugal Pumps.** New catalog covering diaphragm pumps, including the Rex 4-in., 4-DV heavy-duty diaphragm pump designed for high gallonages and tough service; Rex double diaphragm pump for big volume jobs; 3-in. diaphragm pumps for easy one-man handling; Rex Water Boy pump, a 2-in. centrifugal pump capable of handling 9300 g.p.h. and 50-ft. heads; 3-in., 4-in. and 5-in. centrifugal pumps; and plunger pumps with in-oil plunger for handling well point systems and all service. **CHAIN BELT CO.**, Milwaukee, Wis.

**Speed Reducers.** Well-illustrated 80-page catalog No. 45 on Herringbone and Herringbone-Maag speed reducers. The book is divided into three sections. The first goes into detail about the whys and wherefores of the herringbone and its manufacture; the second part is devoted to tables that are a guide to the rating and selection of this type of reducer, giving detailed technical information, measurements, etc., and the third part is photographs showing actual installations. **W. A. JONES FOUNDRY AND MACHINE CO.**, Chicago, Ill.

## West Penn Sand Company Making Improvements

**THE** West Penn Sand and Gravel Co., Rochester, Penn., is making extensive improvements and repairs at its plant along the Ohio river between Rochester and Freedom.

Two large sand dredges and a tow-boat, on which repairs formerly were made at some point on the Monongahela river, are now being overhauled and repaired at the company's location at Rochester.

One of the dredges is being changed to enable loading of new deck barges recently ordered by the company from the Midland Barge Co. The machinery on the other dredge is being overhauled in addition to other improvements.

New keelsons will be placed in the tow-boat *Milton*. The cabins will be removed and in their place will be built new quarters for the crew.

All the machinery at the plant is being overhauled. A large traveling crane was taken down and rebuilt during the winter months.

A one-story frame building 50x150 ft. is being erected at the plant. In the building will be located a machine shop, storage room and wash-room. Other improvements are being contemplated by the company.

The plant has been in operation four years. Over 2,000 car loads were shipped from the plant last year.

Mike Mannella, Pittsburgh, who has been associated with river work in Beaver Valley for the last 25 years, is president of the company. George Brouse, Rochester, is the plant superintendent and is in charge of all improvements.

P. D. Palmer, Pittsburgh, Penn., is general salesmanager. William H. Bickerstaff, Beaver Falls, is local salesman.—*Beaver (Penn.) Times*.

## U. S. Gypsum Buys Another Metal Lath Concern

**THE** United States Gypsum Co., Chicago, Ill., has acquired the Northwestern Expanded Metal Co. Acquisition will enable company to broaden and improve its production and distribution of metal lath products.

Manufacturing and sales will be conducted as the Northwestern Expanded Metal division of United States Gypsum Co. The Northwestern company has two plants, one located in Chicago and the other in Jeanette, Penn.

## American Refractories Institute Meeting

**THE** American Refractories Institute, Oliver Building, Pittsburgh, Penn., will hold its annual meeting at White Sulphur Springs, W. Va., May 19 and 20.